# Cranes & Hoists

BONITRON

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Barges / Ships
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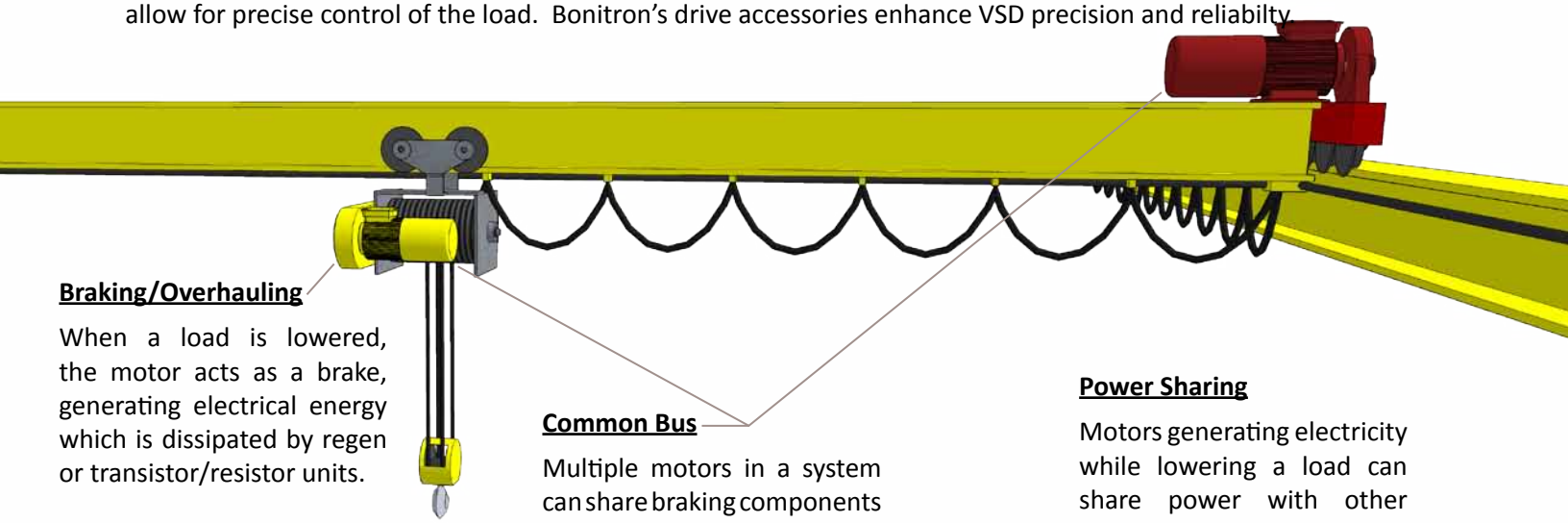
- *Maximize drive system efficiency and reliability*
- *Safely lower loads without tripping drives*
- *Utilize braking current to power other drives*
- *Backup power to protect from sags and outages*

## Products

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

# Overvoltage Solutions

Cranes and hoists are used extensively in industry and construction as a means to lift and place heavy loads. Many of these cranes and hoists are powered by electric motors with Variable Speed Drives (VSDs) that allow for precise control of the load. Bonitron's drive accessories enhance VSD precision and reliabilty.



**Braking/Overhauling**

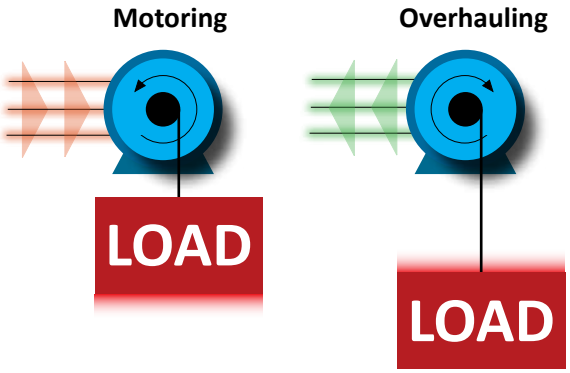
When a load is lowered, the motor acts as a brake, generating electrical energy which is dissipated by regen or transistor/resistor units.

**Common Bus**

Multiple motors in a system can share braking components and reduce wiring by utilizing a common DC bus.

**Power Sharing**

Motors generating electricity while lowering a load can share power with other motors on a DC bus using common bus sharing diodes.



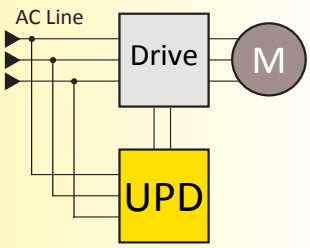

A motor connected to a load will be either "**motoring**" or "**overhauling**". A motoring motor is converting electrical energy into mechanical energy as is the case when a load is being lifted. An overhauling motor is being driven by the load and is converting mechanical energy in to electricity, acting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

An overhauling load is generating power that, if left alone, could potentially cause an overvoltage fault in the drive. If this happens the motor will be out of control and will need to rely on mechanical stops. This situation could be a safety hazard or could potentially damage the equipment being run by the motor. The overvoltage fault can be avoided by implementing either a dynamic brake or a regenerative brake.

## UPD Lite

*For emergency power*

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

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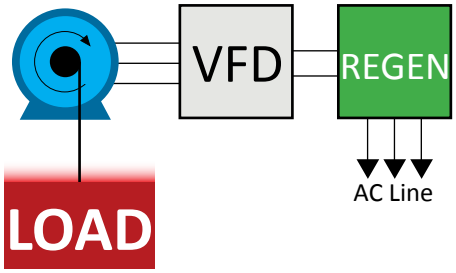
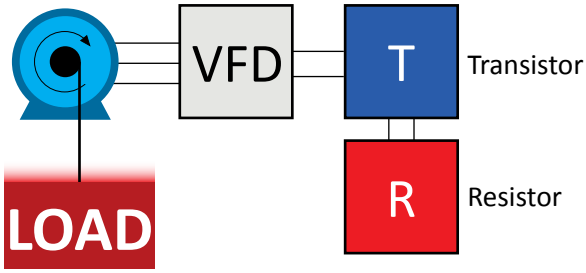
# Transistor & Resistor vs. Line Regeneration

Braking units prevent overvoltage faults on drives. A **dynamic brake** or "chopper" uses transistors, which detect overvoltage situations, together with resistors to dissipate the excess energy. A **regenerative brake** channels the energy back onto the utility grid where it can be used by other equipment within the facility.

**Line Regeneration**




**Dynamic Braking**

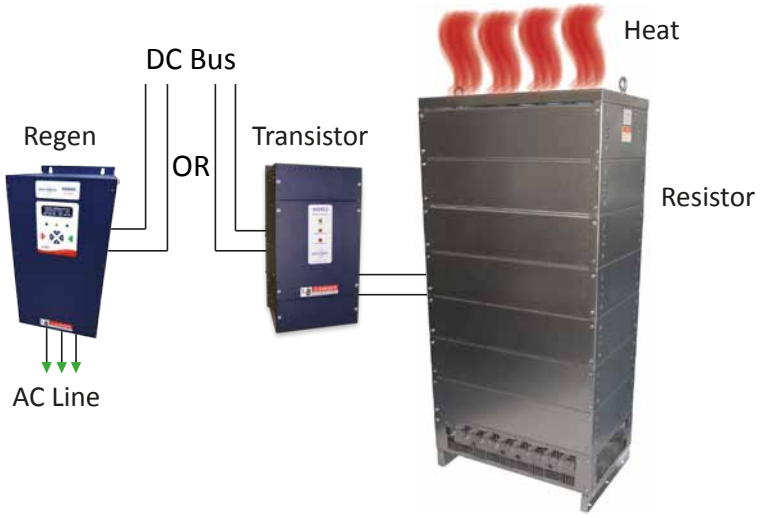



## Dynamic Braking

The dynamic brake method typically has a lower upfront cost, but heat generated by resistors can increase cost two ways. If the resistors are indoors, added cooling capacity may be required for the room. Large resistor banks may be kept outside, far from the drive, but this results in more wiring and conduit cost. Resistors also need time to cool down after a braking cycle. ***Regen units are rated for continuous use and so are typically a better choice for high duty applications such as cranes and hoists where utility power is used.***

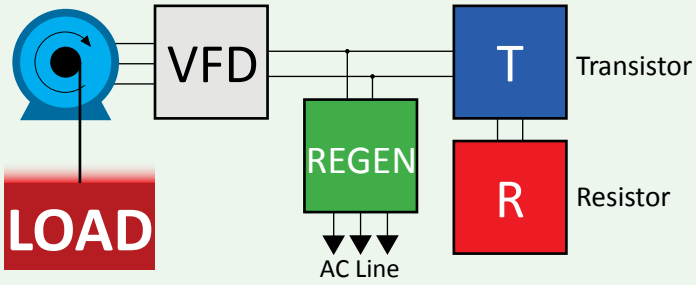
## Line Regeneration

Line regen solutions have many advantages. First, because the unit does not generate high levels of heat (99% efficient), it can be integrated into the drive cabinet. Second, the lack of heat generation allows its use in environments where there might be flammable material such as feathers, dust, or wood. ***The regen also boosts energy efficiency as it puts electricity back onto the AC line where it can be used by other equipment, considerably reducing the demand from the utility.***




## Combination

A regen is most effective for frequent or continuous braking up to 300A, while a transistor/resistor is more suited to higher peak loads for shorter durations. If necessary, transistor/resistor and regen units can be used together for a more efficient solution where the ***regen handles continuous braking needs and the dynamic brake activates when the regen's capacity is surpassed.***



# Common DC Bus

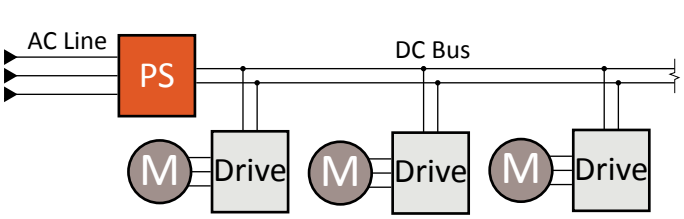
Crane and hoist applications can require the use of multiple electric motors in a system and can benefit from the use of a common DC bus. The use of a common bus allows for the **reduction of wiring and components** in the system as the linked drives can now share many components. It can also allow for 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.

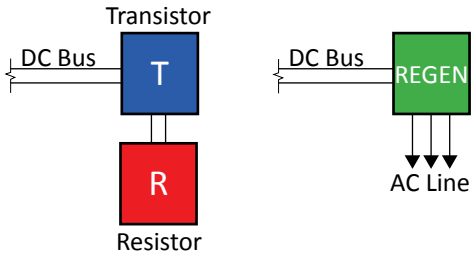
## Common Bus Power Supply

*M3712, M3713*

Using a common bus power supply reduces the amount of wiring and components in a system, resulting in a reduction of maintenance and footprint of the system. In a system with multiple motors, some motors may be regenerating while others are motoring. ***The common bus allows the regenerating drives to share power with the motoring drives, thus reducing 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 3-phase motors without having to oversize the drive. The M3712 can create a common DC bus from single phase power while the M3713 uses 3-phase input power.

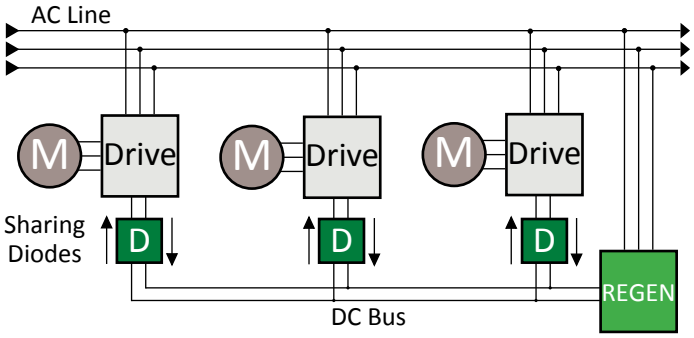



## Common Bus Sharing Diodes

*M3345CBM*

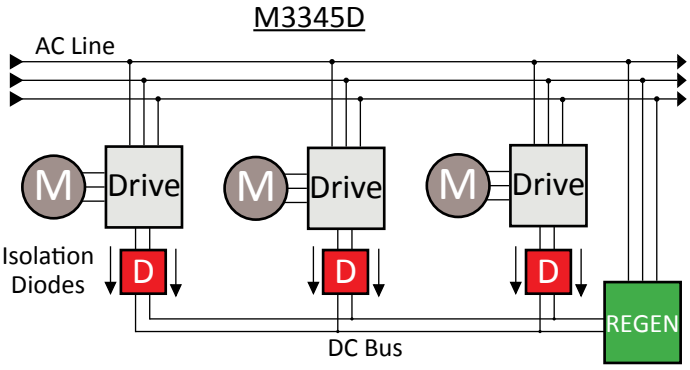
If drives on the AC line are connected by a DC bus, circulating currents can be created that might cause drive faults. The sharing diodes allow a **two way flow of power** to and from drives enabling them to share power between their DC busses while preventing circulating currents. The two-way flow allows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




## 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.



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