



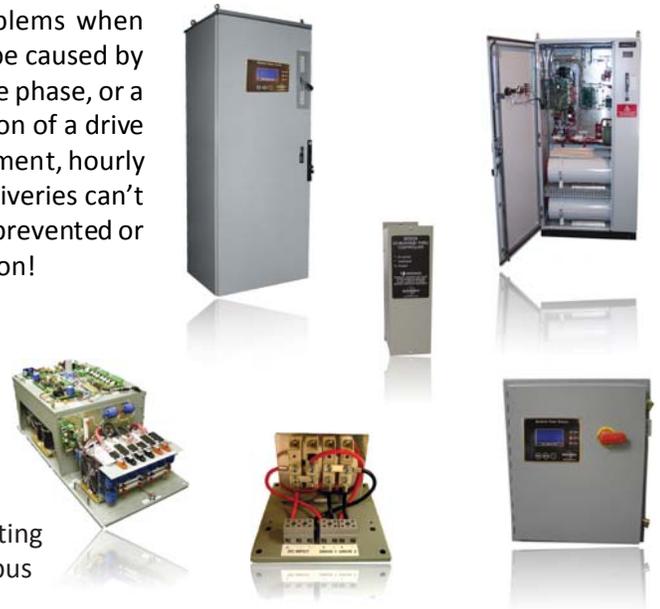
Power Technology Solutions for the World

UNDERVOLTAGE SOLUTIONS FOR AC DRIVES

Variable frequency drives (VFDs) are quite susceptible to problems when fluctuations (undervoltage) in incoming power occur. This could be caused by voltage sags or transients from the power utility, the loss of a single phase, or a complete outage. Any one of these can greatly effect the operation of a drive or an entire facility. The cost of damaged product, damaged equipment, hourly pay during downtime, and loss of customer confidence when deliveries can't be met can be disastrous for a company. These expenses could be prevented or minimized with the application of a Bonitron Undervoltage Solution!

One solution is Ride-Thru. Bonitron offers Ride-Thru Solutions to control undervoltage problems in three main categories: **50% Sag**, **100% Short Term Outage**, and **100% Long Term Outage**. Many attributes associated with conventional "Ride Through" include:

- Restarting "on the fly"
- Meeting SEMI-47 specification
- Automatic restarts
- Using kinetic energy from decelerating the loaded motor to pump up the bus



While all may be considered "Ride Through" methods, none consider loss of motor speed a problem. Bonitron defines Ride-Thru as having no effect on motor speed or torque. A Bonitron Ride-Thru allows you to maintain full control over the process. If maintaining motor speed is critical to your application, make sure you choose a Bonitron Ride-Thru.

In addition to protecting from power sags, Bonitron's Ride-Thru Modules protect from short and long term outages as well. They are used with VFDs to provide protection from a voltage sag, a few cycle dip from a transient, the total loss of one phase, or a complete outage. This provides the security of riding through these events without loss of motor speed control, total motor drive shutdown, or the concerns associated with the various other methods of power supply backup. Bonitron Ride-Thru Modules meet or exceed SEMI-47 specifications and can be outfitted for a single drive or an entire process line. This wise investment maximizes production time by minimizing drive trips and saves money by preventing loss of product in critical process applications.

50% Sag - Even as the most common type of disturbance, sags are the least costly to protect against. Bonitron's low cost solutions use IGBT boost switching technology and have no energy storage to degrade over time. This method boosts the incoming voltage as it drops in order to maintain a 90% DC bus for the drive to maintain motor speed.

100% Short Term Outage – Short term outages ranging up to 20 seconds can occur when reclosure systems are in use or when power is switched between sources. Bonitron's solutions use the standard boost regulator with electrolytic or ultra capacitor storage banks, resulting in a life expectancy of 10+ years and over 100,000 cycles!

100% Long Term Outage – Long term outages range from 20 seconds to 15 minutes and occur when power is lost to the facility. Batteries are used in conjunction with a specially configured switching boost regulator in order to maintain drive voltage while the facility starts local generator sets. Life expectancy is determined by the batteries.

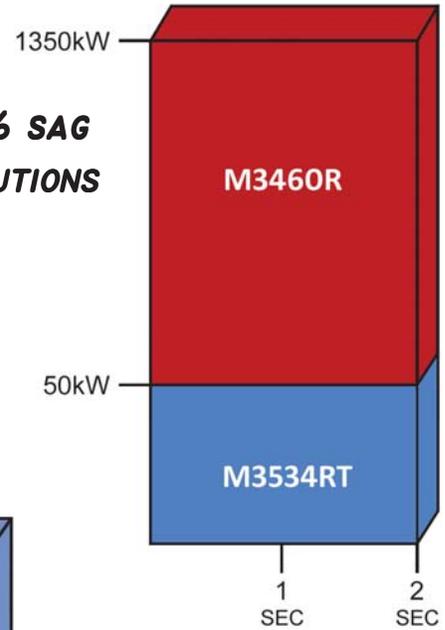
Bonitron Ride-Thru products connect in parallel with the drive via a simple 5 wire connection. When properly installed and fused, the parallel connection increases drive system reliability and system confidence. Since Bonitron's Ride-Thru Systems use little energy in standby mode (0.1% of rating on average), operating costs are very low.

Your **carbon footprint** is also **reduced** due to energy savings and avoided material loss!

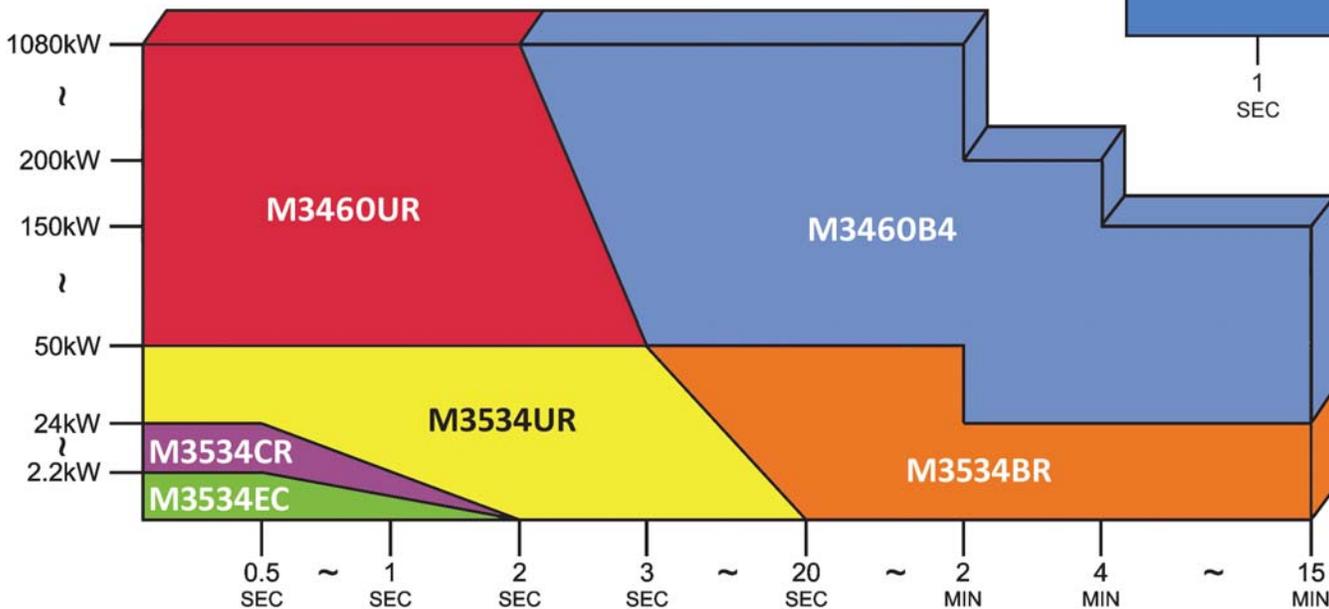
Ride-Thru Solutions

The charts to the side and below represent the most cost effective coverages of Ride-Thru protection. The application coverages are determined as system power in kW by sag or outage duration time.

50% SAG SOLUTIONS



100% OUTAGE SOLUTIONS



M3534RT Boost Regulator

- 1 to 67hp Drives - 2 Second 50% Sag -

The **M3534RT** is a Ride-Thru device designed to regulate the DC bus inverter during a voltage sag event. As the incoming voltage level drops, the M3534RT becomes "active" in order to boost the rectified DC up to the minimum level needed by the inverter. For applications with SEMI-47 or 50% sag specification, the M3534RT is the most cost effective solution for holding up a fixed bus inverter. For 100% outage applications the M3534RT becomes an energy reservoir voltage regulator when used in conjunction with Bonitron batteries or capacitors.

SHORT TERM 50% SAG



M3460R Boost Regulator

- 75 to 1350kW Drives - 2 Second 50% Sag -

The **M3460R** Ride-Thru provides 2 seconds of ride through capability for 3-phase voltage sags up to 50%, enabling the associated VFD to far exceed SEMI-47 specifications for industrial equipment. The use of IGBT switching technology and the absence of batteries in the M3460R results in low maintenance and long life expectancy. The capability to load test the Ride-Thru and drive while on line increases confidence in system reliability.

SHORT TERM 100% OUTAGE

M3534EC Electrolytic Capacitor Bank

- Fractional to 3hp Drives - 0.5 Second 100% Outage -

The **M3534EC** Ride-Thru protects from short term AC line voltage sags and outages by incorporating electrolytic capacitor energy storage reservoirs with soft precharge. Under proper conditions, this **no maintenance** capacitor system is designed to last **10+ years** with **over 100,000 cycles!**



M3534CR Electrolytic Capacitor and Boost Regulator

- 3 to 15hp Drives - 0.5 Second 100% Outage -

The **M3534CR** Ride-Thru provides protection from short term AC line voltage sags and outages by incorporating electrolytic capacitor energy storage reservoirs with the base M3534RT Boost Regulator. The Boost Regulator mines 75% of the stored capacitive energy, making the overall system smaller and less expensive. Under proper conditions, this **no maintenance** capacitor system is designed to last **10+ years** with **over 100,000 cycles!**

M3534UR Ultra Capacitor and Boost Regulator

- 15 to 67hp Drives - 3 Second 100% Outage -

The **M3534UR** Ride-Thru Module provides protection from short term AC line voltage sags and outages by incorporating ultra capacitor energy storage reservoirs with the base M3534RT Boost Regulator and a M3528 Charger Module. This ultra capacitor system is designed to last **10+ years** with **over 100,000 cycles** of **maintenance free** operation under proper conditions.



M3460UR Ultra Capacitor Ride-Thru

- 75 to 1350kW Drives - 3 Second 100% Outage -

The **M3460UR** Ride-Thru Module provides protection from short term AC line voltage sags and outages by incorporating ultra capacitor energy storage reservoirs with the base M3460R Boost Regulator and a transformer isolated M3528 Charger Module. This ultra capacitor system is designed to last **10+ years** with **over 100,000 cycles** of **maintenance free** operation under proper conditions.

M3460C Ultra Capacitor Bank Add on for Existing M3460R Modules

The **M3460C** is an enclosed ultra capacitor energy storage cabinet with charger module. By adding the M3460C to an existing M3460R Ride-Thru Module, a 100% outage for a full 0.5, 1, 2, or 3 second spec can be achieved. This would cover virtually all short term power quality issues and exceed SEMI 47 specifications. Ultra caps require **no maintenance** and have a **10+ year life** with **over 100,000 cycles!**



M3534BR Battery Voltage Regulator

- 15 to 134hp Drives - 90 Second 100% Outage -

The **M3534BR** Battery Voltage Regulator solves the 30% voltage swing problem associated with battery banks by regulating the battery bank voltage and boosting it to the drive bus level as it drops during discharge. An optional battery bypass can be installed so that the system will continue to run during an outage event, even if a battery fails.

LONG TERM 100% OUTAGE

M3460B4 Battery Voltage Regulator

- 75 to 200kW Drives - 15 Minute 100% Outage -



When used with a battery bank, the **M3460B4** Battery Regulator Ride-Thru Module will provide DC bus support for up to 15 minutes during a 100% power outage as well as AC line voltage sags for AC drive systems using a fixed bus as with VFDs. The M3460B4 solves the “voltage drop” problem associated with battery banks in back-up situations by regulating the battery bank voltage and boosting it as it drops. An optional battery bypass can be installed so that the system will continue to run during an outage event, even if a battery fails.

COMMON BUS POWER SUPPLY

M3534PR Common Bus Supply with Ride-Thru

- 1 to 67hp Drives -

The **M3534PR** is a combination of a Rectifier and Ride-Thru and is used to provide common DC bus power for multiple AC PWM inverters. Under normal line conditions the input AC power will be rectified, filtered, and supplied to the DC bus of the drives through the DC bus inductors. If the AC line voltage sags, the Ride-Thru section of this module will become active and regulate the bus voltage.



M3460P Common Bus Supply with Ride-Thru

- 75 to 200kW Drives -

The **M3460P** is a combination of a Rectifier and Ride-Thru and is used to provide common DC bus power for multiple AC PWM inverters. Under normal line conditions the input AC power will be rectified, filtered, and supplied to the DC bus of the drives through the DC bus inductors. If the AC line voltage sags, the Ride-Thru section of this module will become active and regulate the bus voltage. The rectifier provides full time power and the Ride-Thru can be sized to meet any of the Bonitron specifications.



Check out our website for individual brochures and complete reference manuals!

— WWW.BONITRON.COM —

Diode Sharing Solutions

M3534D Diode Sharing Module

- Up to 67hp -

Bonitron's **M3534D** Diode Sharing Modules are used with the M3534 Series and provide blocking diodes that isolate the drives from each other while still establishing a shared, common Ride-Thru bus. This can be used on equally sized and loaded drives within a system, allowing the use of a single boost regulator with more than one drive.

