

## Frequently Asked Questions

### **BEFORE YOU CALL**

If technical help is required, please have the following information when calling:

- Model number of unit
- Serial number of unit
- Name of original equipment supplier (if available)
- Record the line voltage
- Record the DC Bus voltage immediately after the AC voltage
- Brief description of the application
- Drive and motor HP or kW
- kVA rating of power source
- Source configuration and grounding

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## Frequently Asked Questions

### 1) What are the potential energy savings from a Line Regen?

The Regen directs energy from the mechanical load to the power distribution line, where the energy is available to other connected loads. These units provide system energy savings over dynamic braking kits, because the net energy required from the distribution system is reduced by the regenerated energy. Additional savings also come from the lack of a need to provide air conditioning with a DB kit and from reduced time spent stopping loads.

To calculate the savings, the regeneration duty cycle, the length of operation, the Regen hp, and the cost of energy must be known. With these application variables, the following calculation may be made to determine the cost savings:

$$\text{\$S} = P(0.746)(t/T)(D)(H)(\text{\$kW})$$

where:	\\$S	=	Savings
	P	=	Power (Hp)
	D	=	Number of days
	H	=	Number of hours per day
	t/T	=	Percent on time
	\\$kW	=	Cost per kW

Assume the following values for this example:

P	=	20 Hp peak, 15 Hp average during deceleration
D	=	365 days
H	=	10 hours per day
t/T	=	5(on)/15(total)
\\$kW	=	\\$0.11 per kW

using:  $\text{\$S} = 15(0.746)(5/15)(365)(10)(\$0.08)$

Savings per year is:

$$\text{\$S} = \$1,497.60$$

## Frequently Asked Questions

### 2) What are the voltage ratings for the M3645?

RATING CODE	VOLTAGE
L	230 - 240VAC
E	380 - 415VAC
H	460 - 480VAC
C	575 - 600VAC

### 3) How do I Enable or Turn-On the M3645?

To provide an Enable Command to the M3645, +24V must be present between TB2-2 and TB2-4 of the M3645.

This may be done with a jumper configuration or an external source.

### 4) Is the M3645 UL listed?

All M3645 models are UL listed.

### 5) What are the fusing requirements for the M3645?

Blown fuses typically indicate a semiconductor device failure or a severe transient. In any case, blown fuses should not be replaced without first consulting Bonitron as catastrophic damage can occur.

Use the following Tables when initially constructing the system.

Note: AC fuses must be J-type or equivalent.

#### Fuse Current Rating Requirements

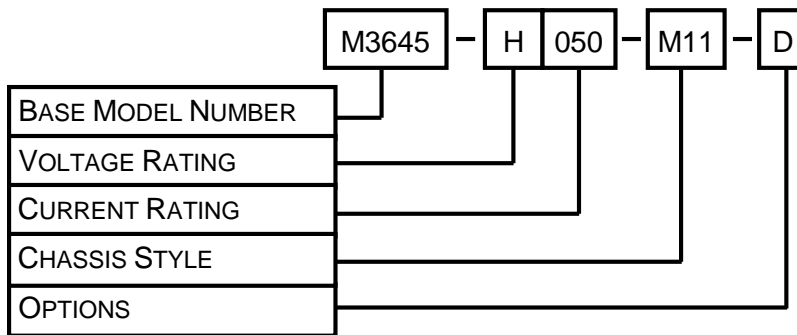
REGEN MODULE	AC / DC FUSE CURRENT RATING
M3645-x030	40A
M3645-x050	60A
M3645-x100	125A

#### Voltage Rating Requirements

SYSTEM VOLTAGE	AC FUSE VOLTAGE RATING	DC FUSE VOLTAGE RATING
230–240VAC	240VAC	350VDC
380–480VAC	600VAC	700VDC
575–600VAC	600VAC	1000VDC

## Frequently Asked Questions

### 6) What is the part number breakdown of the M3645?



### 7) Paralleling Regens?

After testing in our labs, the product design team has determined that the current version of the M3645 regens has the following limitations when used in parallel:

- 1) Only two may be used in parallel.
- 2) The combined units must be derated by 10%.
- 3) This means the largest regen application that can be done with these units is 180A continuous, 260A peak

### 8) What is the true voltage range for the M3645?

L: 208-253 VAC  
E: 380- 460 VAC  
H: 415-506 VAC  
C: 520 – 630 VAC

## Frequently Asked Questions

### 9) How do you access the Fault Screen on the M3645 with a digital display?

On units with a digital display, the display stores records of past faults. (See Fault Digital Display operation)

#### Digital Display Operation

These screens display information about the M3645 on units equipped with digital displays.

#### Metering Screen

This screen displays the present DC bus voltage, DC regen current, regen power, and how long the unit has been powered on since shipment.

*Left:* Faults screen      *Right:* Faults screen      *Down:* Energy Records screen

#### Energy Records Screen

This screen displays the total energy regenerated by the unit since shipment, along with the total energy regenerated since the user reset the energy count.

*Up:* Metering screen      *Down:* Fault Records screen

#### Reset Energy Records Screen

This screen allows the user to reset the record of energy regenerated by the unit.

*Up:* Energy Records screen    *Enter:* Confirm reset

#### Faults Screen

This screen shows the present fault state of the unit, scrolling through all faults detected, if any.

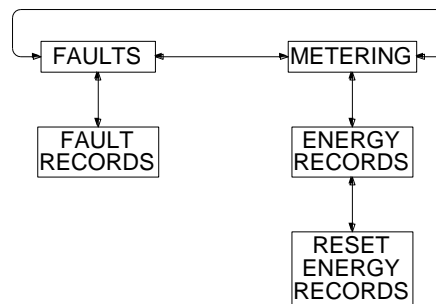
*Left:* Metering screen      *Right:* Metering screen      *Down:* Fault Records screen

#### Fault Records Screen

This screen shows a record of a previous fault state, including all faults and the time since first power-on that the fault state occurred. The display stores the 100 most recent fault states.

*Left:* Previous fault in the record      *Right:* Next fault in the record

*Up:* More recent fault state      *Down:* Older fault state      *Cancel:* Faults screen



## Frequently Asked Questions

### 10) Drive trips on DC Bus Overvoltage during Breaking with a M3645?

If the attached drive trips, it typically indicates the Regen is not operating. There are some simple things that can determine the cause.

- Make sure the Regen has power and is enabled. The "Ready" output will close if the unit is ready to operate.
- If there are active faults, the unit will not operate, and the attached drive will trip during braking.
- Check DC bus voltage at fuses.
- Check DC bus polarity at fuses.
- Check DC bus fuses.
- Ensure unit is not faulting during operation. Some faults may clear themselves, such as phase loss, but the fault record will show that they have occurred. Check fault the records to see if the Regen unit has other faults that would cause the operation to stop. (See Faults to check fault records) Once the Regen stops operating, the attached drive will fault on overvoltage during heavy braking.
- This can also mean that the Regen is too small to handle the braking requirements. If the braking energy is too high for the Regen to dissipate, the Regen will go into current limit. While the Regen is operating in current limit, the DC bus may continue to rise to the point that the drive will trip. The current being regenerated can be checked with the digital display or with a separate meter in the DC link. Verify proper sizing of the Regen unit. If the Regen is operating in current limit, the Regen may be undersized for the application.
- If the regen and drive are connected to the AC line through a transformer, the transformer may not be large enough to handle the regenerated currents. See (3 phase AC Input) for transformer sizing instructions.

### 11) What if M3645 will not enable?

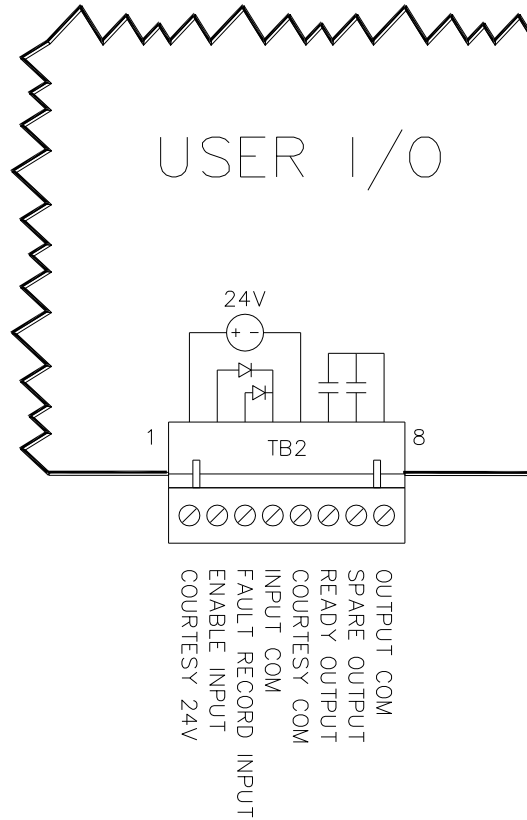
Confirm that 24V is present between TB2-2 and TB2-4.

If the internal courtesy 24V supply is being used, confirm that a jumper is present between TB2-4 and TB2-5

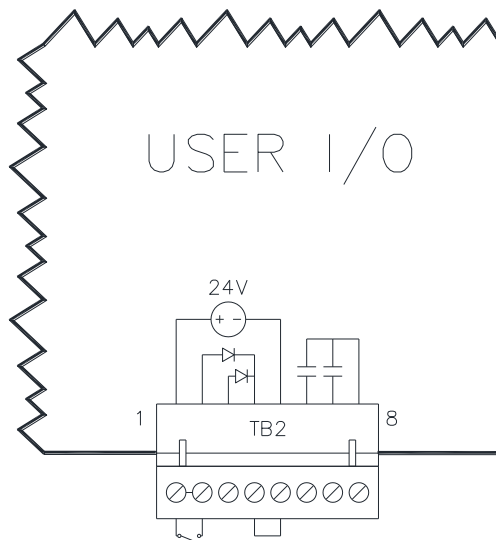
See Below for how to wire a jumper to the internal 24V or how to apply an external 24V source to control the unit remotely.

## Frequently Asked Questions

### M3645 with Internal User I/O Connections

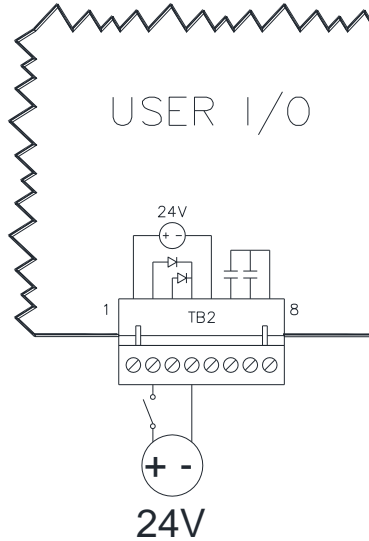


### M3645 with Internal Enable Input



## Frequently Asked Questions

### M3645 with External Enable Input



### 12) How do you view the Faults on a M3645 with LED display?

On units with a digital display, the display stores records of past faults. (See Fault Display)  
 On units without a digital display, the unit's most recent fault state may be accessed by disabling the unit (See Enabling), then setting the Fault Record Input high. The red LED will blink out all the faults of the most recent fault state, in sequence.

#### Blink Codes

FLASHES	FAULT
Solid	Unit is not Enabled
1 Fast	Feedback Undervoltage
2 Fast	Overtemperature
3 Fast	DC Overvoltage
4 Fast	Differential Overvoltage
5 Fast	Sync Loss
1 Slow	IGBT Driver
2 Slow	Phase Overcurrent
3 Slow	Phase Loss
4 Slow	DC Undervoltage
5 Slow	Precharge Failure
6 Slow	Frequency Detect Failure

Note: Slow: 1 blink per second  
 Fast: 3 blinks per second



## Frequently Asked Questions

### 13) My M3645 is blinking, what do the blinks mean?

On units without a digital display, the unit's most recent fault state may be accessed by disabling the unit (See Enabling), then setting the Fault Record Input high. The red LED will blink out all the faults of the most recent fault state, in sequence.

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