

PQSI NiceCube* ... Completely Integrated Voltage Sag Tolerant Module From Power Quality Solutions Inc.

Industrial electrical equipment is often affected by power supply disturbances, most notably voltage sags. Numerous electric power quality studies have found that common, general purpose AC relays often contribute to these electrical equipment shutdowns. Typically referred to as an "ice cube" relay due to its clear plastic cover that resembles a square ice cube, these AC-powered relays may be susceptible to many voltage sags that do not affect other elements of a control system. Therefore, they present an "Achilles heel" that may cause an entire machine, processing line, or entire factory to shut down during minor voltage sags.

With an average dropout at or near 70 percent of nominal for a cycle or less, these simple but sensitive devices contribute to an average 13 or more equipment related process shutdowns per year in typical distribution-fed commercial or industrial facilities. Modern industry requires a more robust alternative to the standard AC ice cube relay. If SEMI F47-compliant units are made available, many power quality-related shutdowns could be avoided. Furthermore, industrial plants could be expected to save from several hundred thousand to several millions of dollars each year in downtime and lost revenue. Worldwide, such improvements could have a significant impact.

Power Quality Solutions Incorporated (PQSI) has successfully developed and had tested by UL/CSA a "NiceCube" design that has proven to be a viable solution to this vexing problem. The NiceCube design offers a simple, elegant, and completely integrated module solution that includes a voltage sag tolerant general purpose DC DPDT relay that allows for the quick, easy replacement of an existing AC DPDT sensitive 24Vac or 120Vac relay for retrofit or new applications. This solution vastly improves the voltage sag ride-through characteristics of previously vulnerable electrical control system circuits such as emergency off circuits (EMO) in semiconductor tools and industrial production lines—with no capacitance incorporated in the design. Therefore, with no time delay for dropout, the NiceCube also finds application in chiller and air compressor controls as well.

120 Vac Solution

PQSI NiceCube VNC 120Vac Input



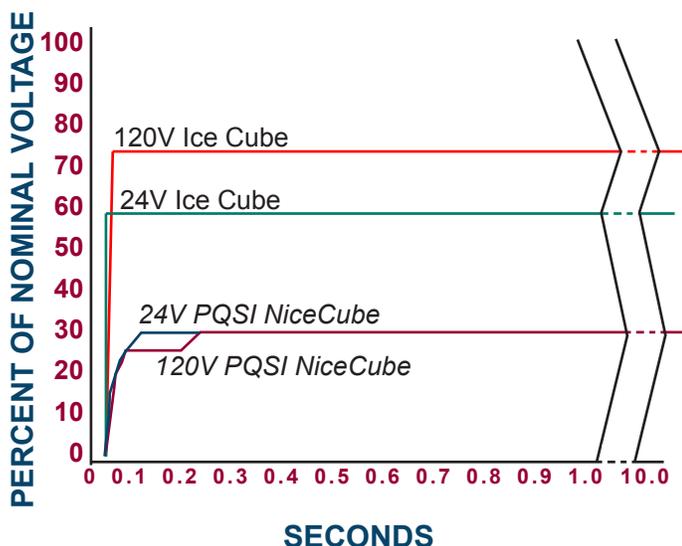
24 Vac Solution

PQSI NiceCube VNC 24Vac Input



A typical NiceCube weighs approximately 7 Oz. (02 kg) and measures 5"H x 1.625"W x 2.25"D

Tolerance and Protection Curves: "Ice Cubes vs. PQSI NiceCubes"



NiceCube Specifications: [1] Provides continuous DPDT relay operation for all IEEE Std. P1159 defined voltage sags to approximately 25% of nominal. [2] Designed to act as a discrete on/off device and will turn off the DPDT relay if the NiceCube input voltage is interrupted for a few cycles. [3] Designed to survive ANSI/IEEE C62.41 Category A and Category B defined transient voltage surges to 6kV/500A. [4] Compatible with stress and vibration common to typical commercial and industrial applications. [5] Ambient Operating Range: -29° C (-20°F) to +55° C (131°F).

PQSI NiceCube Warranty: Unconditional free NiceCube replacement for one year from date of purchase. Neither PQSI nor its business associates are responsible for any production loss or damage caused by a NiceCube misapplication or NiceCube failure.

For Technical and Pricing Information Contact:

PQSI

Power Quality Solutions, Inc.

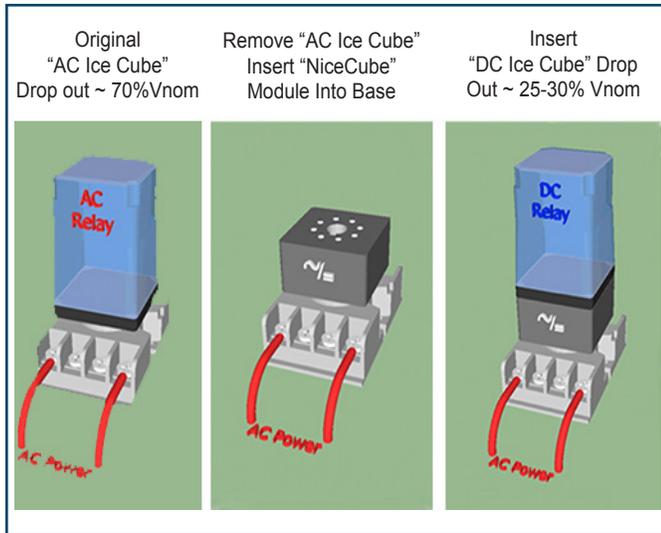


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* Source: Electric Power Research Institute, Inc.

PQSI NiceCube Applications, Installation, and Advisory Notes

[a] The PQSI NiceCube eliminates costly process downtime, installs in minutes for new or retrofit applications (see below figure), and can be a cost-effective alternative to other voltage sag protection methods.



General Specifications (UL 508)		750XBX	
Contact Characteristics		Units	Standard
Number and type of Contacts			DPDT
Contact materials			Silver Alloy
Thermal (Carrying) Current		A	16
Maximum Switching Voltage		V	300
Switching Current @ Voltage		Resistive	16A @ 277V 50/60Hz
		Resistive	16A @ 120V 50/60Hz
		Resistive	16A @ 28V
		HP	1/3 @ 120VAC
		HP	1/2 @ 240 VAC
		Pilot Duty	B300
		A	3 @ 150VDC
Current rating with magnetic blowout - Code 69			
Minimum Switching Requirement		mA	100 @ 5VDC (.5W)
Coil Characteristics			
Voltage Range		V	6...240
		V	6...125
Operating Range	% of Nominal		85% to 110%
			80% to 110%
Average consumption		VA	3
		W	1.4
Drop-out voltage threshold			15%
			10%
Performance Characteristics			
Electrical Life (UL508)	Operations @ Rated Current (Resistive)		100,000
Mechanical Life	Unpowered		5,000,000
Operating time (response time)		ms	20
Dielectric strength	Between coil and contact	Vrms	1500
	Between poles	Vrms	1500
	Between contacts	Vrms	1500

- [b] For proper NiceCube operation, observe conventional isolation and grounding techniques on all NiceCube terminal points and avoid any “sneak” ground paths.
- [c] The NiceCube should be installed in an electrical / fire enclosure that complies with the applicable safety standard.
- [d] **Safety Caution:** Read all instructions thoroughly prior to installation. If this equipment is used in a manner not specified, the protection provided by this equipment may be impaired.
- [e] **Safety Caution:** Risk of electric shock if this equipment is not connected in accordance with Figure 1. below.

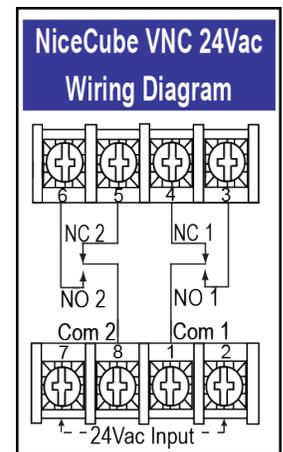
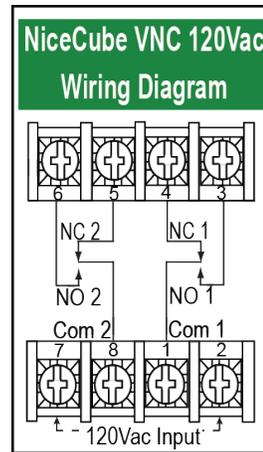
Figure 1. NiceCube Octal Mounting Base Socket Terminal Connection Layout

In new applications, proceed as follows:

Step #1 Determine whether the AC-powered relay application is 120Vac or 24Vac. For 120Vac input electric service use the PQSI Model NiceCube VNC 120Vac Input, and for 24Vac input electric service use the PQSI Model NiceCube VNC 24Vac Input.

Step #2 For 120Vac input electric service, connect the wires to the NiceCube VNC 120Vac input module’s octal mounting base socket terminals 7 and 2. For 24Vac input electric service, connect the wires to the NiceCube VNC 24Vac module’s octal mounting base socket terminals 7 and 2.

Step #3 Referring to the wiring diagrams on the right of this figure, select the locations for the Com, NO and NC DPDT contact arrangements and terminal numbers on the octal mounting base socket that correspond with your Com, NO, and NC circuit applications. Note connect to Com 1 through octal mounting base socket terminal 1, NO 1 through terminal 3, and NC 1 through terminal 4. In a similar way, connect to Com 2 through octal mounting base socket terminal 8, NO 2 through terminal 6, and NC 2 through terminal 5.



In existing or retrofit applications, proceed as follows:

Step #1 Determine whether the AC-powered relay application is 120Vac or 24Vac. For 120Vac input electric service select the PQSI Model NiceCube VNC 120Vac Input, and for 24Vac input electric service select the PQSI Model NiceCube VNC 24Vac Input.

Step #2 Remove the “AC Ice Cube” and insert the selected PQSI Model NiceCube VNC module with DC relay into the existing octal mounting socket assembly.

PQSI VNC 120Vac and 24Vac Models

PQSI NiceCube Models	Comments
NiceCube VNC 120Vac Input	UL/CSA Compliant File E255764
NiceCube VNC 24Vac Input	UL/CSA Compliant File E255764