

NOsparc® GCKAC3T480

USER MANUAL

This product is manufactured under the following patents: US 8,619,395; US 9,087,653; US 9,423,442; US 9,508,501; US 9,847,185; US 10,134,536; US 10,566,150; US 10,727,005; and US 10,727,010. Other patents pending.

Contact Arc Suppressor for Normally Open AC Power Relays and Contactors



IMPORTANT NOTES

This document provides information required to install a NOsparc arc suppressor.
You must read and understand this document before installing this device.

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104-0057C

If you have any trouble with your installation, please refer to Technical Support contact information below.
Full Terms & Conditions and Warranty Available at: www.ArcSuppressionTechnologies.com

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TRADEMARKS

"NOsparc" is a registered trademark of Arc Suppression Technologies. All other trademarks are property of their respective owners.

APPLICABLE DOCUMENTS

The UL Recognized Component mark indicates that UL LLC has certified this product's compliance as Industrial Control Equipment NKCR2 "Auxiliary Devices - Component" for the United States, per UL 508-18th Ed. and NKCR8 "Auxiliary Devices Certified for Canada - Component", per CSA-C22.2 No. 14-18, 13th Ed.



PART NUMBER & PRODUCT DESCRIPTION

G	C	K	AC	3	T	480
Maximum Circuit Fuse Rating: G = 200A	Wiring Requirements: C = contact(s) + coil	Product Case Model Code: K = K-Case (three-phase, panel-mount)	Power Type: AC = Alternating Current	Phases (Poles) per Product: 3 = three-phase	Termination Style: T = screw terminals	Maximum Voltage: 480 = 480Vac

LIFE SUPPORT NOTICE

Arc Suppression Technologies products are specifically NOT authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Arc Suppression Technologies.

As used herein:

Life support devices or systems are devices or systems which support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

LEGAL NOTICE

Information in this document is believed to be accurate and is provided solely in connection with Arc Suppression Technologies products.

Arc Suppression Technologies makes no warranties, expressed or implied, regarding the information contained herein.

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Arc Suppression Technologies only accepts products for repair or return that are accompanied by a Return Material Authorization number from either our company or the appropriate distributor or sales representative.

Please refer to your original purchase agreement or contact your distributor or sales representative for return policy information.

SAFETY INFORMATION OVERVIEW

We use note, caution and warning symbols throughout this book to draw your attention to important operational and safety information.

"WARNING" describes an alert with information that is important for protecting personnel and equipment from damage.

"CAUTION" describes any condition that could result in damage to the equipment or result in physical harm to personnel.



The **CAUTION or WARNING** "SAFETY" alert symbol (an exclamation mark in a triangle) precedes a general caution or warning statement. It describes safety requirements to meet local, national and international standards.



The **Electrical Shock Hazard CAUTION OR WARNING** symbol, (a lightning bolt in a triangle) precedes an electric shock hazard. It describes a potential electrical shock hazard which can result

in personal injury or death.

"NOTE" describes any item of interest to the user, owner, or operator.

WARNINGS

Disconnect all power to circuits and panels where this product is about to be installed or when installing this product.



After initial installation and power-up, observe arc suppressor to confirm that all three green LED "READY" indicator lights are on. If ALL green LED "READY" indicator lights are NOT on, then the arc suppressor has either been improperly installed or is not functioning, and you MUST IMMEDIATELY: KILL MAIN POWER prior to troubleshooting or replacement.



This User Manual must be thoroughly understood and accurately followed to avoid unintended equipment operation.

The assembly must conform to National Electric Code (NEC) safety standards, as well as locally applicable codes. Failure to do so could result in personal injury or loss of life. See the product rating curve for wire gauge selection, ambient temperature and current restrictions.



Follow extreme caution when conducting short cycle time tests, especially below the maximum rated cycle time for the associated relay; and NEVER LESS THAN A 16s CYCLE TIME. Even at significantly reduced power levels the relay contacts become extremely hot due to high current densities at the point of contact constriction just before the contact breaks open. Always follow the relay manufacturers specifications and requirements and DO NOT CYCLE CONTACTS MORE THAN 225 TIMES PER HOUR.



Only authorized and qualified personnel should install and service the NOsparc GCKAC3T480. Failure to comply with these recommendations may result in damage to equipment and property and injury to personnel.



Always test the function and performance of NOsparc in the intended application.

An arc suppressor DOES NOT eliminate arcing, therefore, NOsparc will not eliminate hazards associated with electrical current contact arcing.



SAFETY

All creepage distances and clearances of NOsparc have been designed to meet requirements of safety standards.

When using NOsparc GCKAC3T480, basic safety precautions should always be followed to reduce risk of fire, electric shock, and injury to persons. When installing NOsparc into your system, make sure that the Quick Connect Terminal connector is properly crimped, terminated, insulated and that the proper wire gauge is used and that the connector is securely seated. Incorrect application or termination can result in harmful or fatal electrical shock or component damage.

CAUTIONS

The NOsparc will pass a leakage current (see specifications) even though the contacts across which it is connected are open (similar to leakage present with snubber use). This capacitive leakage current can be sufficient to turn-on some solid state and electromechanical relays, or to cause electric shock to personnel. Therefore:

- The NOsparc must never be connected across relay, contactor, or snap action switch contacts driving high impedance loads.

- The NOsparc must never be connected across relay, contactor, or snap action switch contacts used for galvanic/safety isolation.

Proper care must be taken when handling and installing NOsparc GCKAC3T480.

Never plug or unplug NOsparc while powered.

Do not connect NOsparc directly to power!

Use caution when installing or modifying power connections.

NOTES

Only connect NOsparc across the contacts of the power switching relay or contactor!

NOsparc capabilities will be effective even under mixed load conditions.

NOsparc has been designed to support the following AC power loads:

- | | | |
|-------------------|-------------|--------------|
| – General purpose | – Inductive | – Ballast |
| – Resistive | – Motor | – Pilot Duty |
| – Capacitive | – Tungsten | |

DO NOT use NOsparc AC products for DC power applications.

DO NOT use NOsparc on the following power circuits:

- | | |
|--------------------|----------------------------------|
| – Non-sinusoidal | – Pulse width modulated (PWM) |
| – Phase controlled | – Variable Frequency Drive (VFD) |

DO NOT connect NOsparc across the following components:

- | | |
|--------------------|---------------------|
| – Fuses | – Safety interlocks |
| – Circuit breakers | – Thermal limits |

DO NOT use NOsparc either above or below its ratings or specifications.

DO NOT operate the contacts to which the NOsparc is attached above or below their ratings or specifications.

DISCLAIMER

All product, product specifications and data are subject to change without notice to improve reliability, function or design or otherwise.

Arc Suppression Technologies, LLC, its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Arc Suppression Technologies"), disclaim any and all liability for any errors, inaccuracies, or incompleteness contained in this User Manual or in any other disclosure relating to any product.

Arc suppression Technologies makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Arc Suppression Technologies disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Arc Suppression Technologies' knowledge of typical requirements that are often placed on Arc Suppression Technologies products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in data sheets and/or specifications may vary in different applications and performance may vary over

time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Arc Suppression Technologies' terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Arc Suppression Technologies products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Arc Suppression Technologies product could result in personal injury or death.

Customers using or selling Arc Suppression Technologies products not expressly indicated for use in such applications do so at their own risk.

MATERIAL CATEGORY POLICY

Arc Suppression Technologies, LLC hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

WARRANTY

NOsparc arc suppressors are manufactured to high quality standards and backed by a warranty that is included in our Terms and Conditions of Sale that can be found at our website:

<https://www.arcsuppressiontechnologies.com/buy-now/terms-and-conditions-of-sale/>

TECHNICAL SUPPORT

Please contact your distributor or sales representative with technical support and product support questions. Have the NOsparc model number available when contacting your representative.

In certain circumstances, direct product support from Arc Suppression Technologies may be reached via the following communication methods:

support@ArcSuppressionTechnologies.com

www.arcsuppressiontechnologies.com/contact-us/support/

Phone +1 (612) 928-5546

CONDITIONS FOR SERVICE

In the event of a product malfunction, Arc Suppression Technologies or an authorized agent should perform all repairs to a NOsparc arc suppressor. It is the responsibility of users requiring service to report the need for service to their distributor or sales representative.

Any components, devices or other equipment used with or adjacent to a NOsparc arc suppressor is the sole responsibility of the end user and not of Arc Suppression Technologies or any of its agents, resellers, representatives or distributors.

RETURN MATERIAL AUTHORIZATION & PROCESS

1. Authorization prior to returning product is required. Please refer to your original purchase agreement or contact your distributor or sales representative for an RMA number and instructions before returning product.
2. After we receive your return, we will examine it and try to verify the reason for returning it.

3. In cases of manufacturing defect, we will enter a replacement order or issue credit for product returned. In cases of customer misuse, we will request a purchase order to provide replacement product.
4. To return products that are not defective, goods must be in new condition, in the original boxes and they must be returned within 120 days of receipt. A 20 percent restocking charge is applied for all returned stock.
5. Arc Suppression Technologies reserves the right to charge for no trouble found (NTF) returns.

DEFINITIONS

Arc Current	Plasma flow supported between open contacts
Arc Suppression	
Duration	Time during which the electrical current contact arc is arrested
Arc Suppressor	Device designed to reduce contact arcing
Break	Action of a contact which transitions from close to open
Bounce	One or more brief transition(s) to the OPEN state as the contact is closing or to the CLOSE state as the contact is opening
Cycle Time	Time between successive ON or OFF contact states
Inductive Load	Motor or transformer form the main part of the load
Inrush Current	Resulting turn-on current when powering an inductive, capacitive or tungsten load
Inrush Current Limiter	Device intended to limit the amount of turn-on current when powering an inductive, capacitive or tungsten load
Make	Action of a contact which transitions from open to close
Make Current	Contact current during Make
MOV	Metal Oxide Varistor
MTBF	Mean-Time-Between-Failures
RC Snubber	Device with resistor and capacitor in series across contact
Snubber	Device designed to limit voltage rise times
Suppression	Action of minimization of undesired event
Varistor Clamping	
Voltage	Voltage at which steady state current through the arc suppressor is ≥ 1 mA
Maximum Varistor	
AC Voltage	Maximum allowed voltage across the arc suppressor (NOT operating voltage)

PRODUCT DESCRIPTION

The GCKAC3T480 contact arc suppressor (AC power applications) protects, cleans, and restores the contact points of 3-phase relays and contactors. This improves their overall performance and extends contact life to the mechanical life of the relay or contactor.

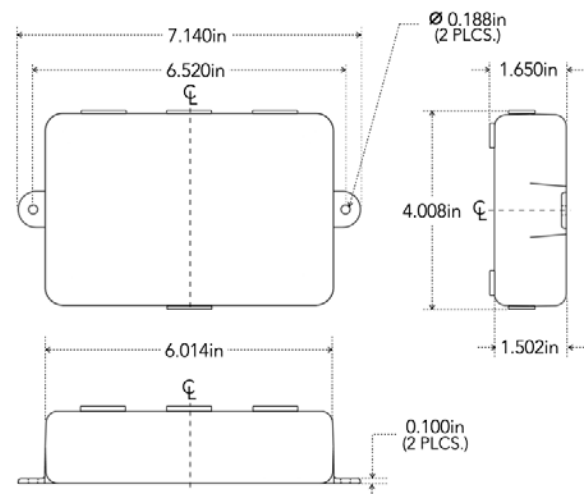
The GCKAC3T480 arc suppressor is designed to suppress contact arcing from 110Vac to 480Vac.

In simple terms, NOsparc operates as follows:

1. NOsparc detects the occurrence of an arc event.
2. NOsparc activates to suppress the arc.
3. NOsparc deactivates when the contacts are open and suppression is not required.
4. NOsparc is continuously protected by over-voltage suppression.

PRODUCT DIMENSIONS AND MOUNTING

NOsparc GCKAC3T480 product dimensions:



The GCKAC3T480 may be panel-mounted at any orientation using the holes in the two (2) tabs on the product.

Mounting holes are 0.188in in diameter and will accommodate a #10 (4.775mm) screw.

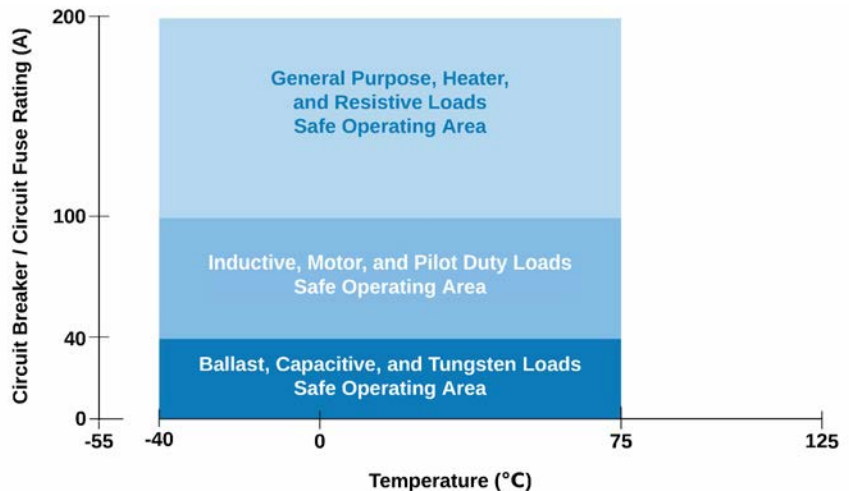


SPECIFICATIONS

CONTACT Specifications	
ABSOLUTE MAXIMUM CURRENT RATING **DO NOT EXCEED**	470A _{rms} at 60Hz / 390A _{rms} at 50Hz <i>This absolute maximum current rating also represents the maximum allowable Locked Rotor Amperage (LRA) for motor loads and the cold filament inrush current for tungsten loads</i>
ARC SUPPRESSION	duration: ½ AC power cycle (maximum)
CIRCUIT BREAKER / FUSE (MAXIMUM)	200A for resistive loads (see Safe Operating Area charts below for more detail)
CLAMPING VOLTAGE	820V (typical at 1 mA)
CYCLING	maximum cycle time: per relay specifications (DO NOT EXCEED relay or contactor operating specs)
LEAKAGE CURRENT	7mA at 480Vac
OPERATING VOLTAGE	110Vac to 480Vac (nominal +/-10%)
PHASE TO PHASE TERMINAL DIELECTRIC ISOLATION VOLTAGE	3750Vac
TERMINATION	across contacts: 8-14 AWG stranded copper wire, insulation stripped 3/8"-½" maximum, screw - rising cage clamp style, torque screw to 1.36Nm (12Lb-in); six (6) total
WIRE GAUGE	wire length between NOsparc and contact terminals: #12AWG up to 24in; #10AWG up to 36in DO NOT use wire lengths over 3 feet
COIL Specifications	
CIRCUITS	one (1) coil connection; either AC <u>or</u> DC (<u>non-polarized</u>)
CLAMPING VOLTAGE	470V (typical at 1mA)
OPERATING CURRENT	26mA (nominal +/- 10 %)
OPERATING VOLTAGE	24Vac to 240Vac (nominal +/-10%); 24Vdc to 250Vdc (nominal +/-10%)
COIL TO PHASE TERMINAL DIELECTRIC ISOLATION VOLTAGE	3750Vac
TERMINATION	across contacts: 12-18 AWG stranded copper wire, insulation stripped 3/8"-½" maximum, screw - rising cage clamp style, torque screw to 1.36Nm (12Lb-in); two (2) total
WIRE GAUGE	wire length between NOsparc and coil terminals: #18AWG up to 72in DO NOT use wire lengths over 6 feet
GENERAL Specifications	
DIMENSIONS	length: 7.140in (18.136cm) width: 4.008in (10.180cm) height: 1.65in (4.191cm)
ENVIRONMENTAL	operating temperature: -40°C to 75°C (-40°F to 167°F), storage temperature: -50°C to 125°C (-58°F to 257°F), humidity: 5% to 95% (non-condensing)
MOUNTING	orientation: any number of holes: two (2) hole diameter: 0.188in (#10 screw) (4.775mm)
MTBF / RELIABILITY	800,000 hours (MIL-HDBK-217F)
POWER FREQUENCIES	typical operating frequencies: 50 Hz / 60 Hz
POWER TYPE	AC (sinusoidal alternating current)
WEIGHT	14.2oz (402g)

CIRCUIT BREAKER / CIRCUIT FUSE DE-RATINGS

The chart (Right) depicts the circuit breaker / circuit fuse Safe Operating Areas for different loads.



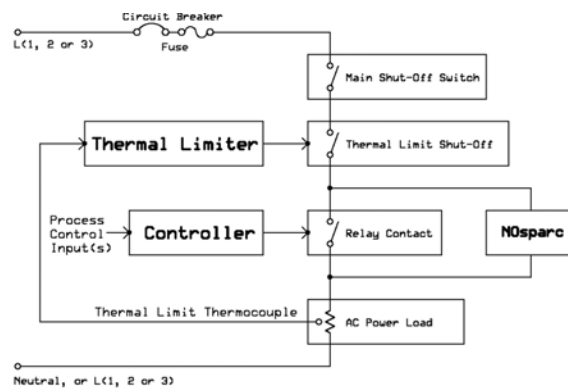
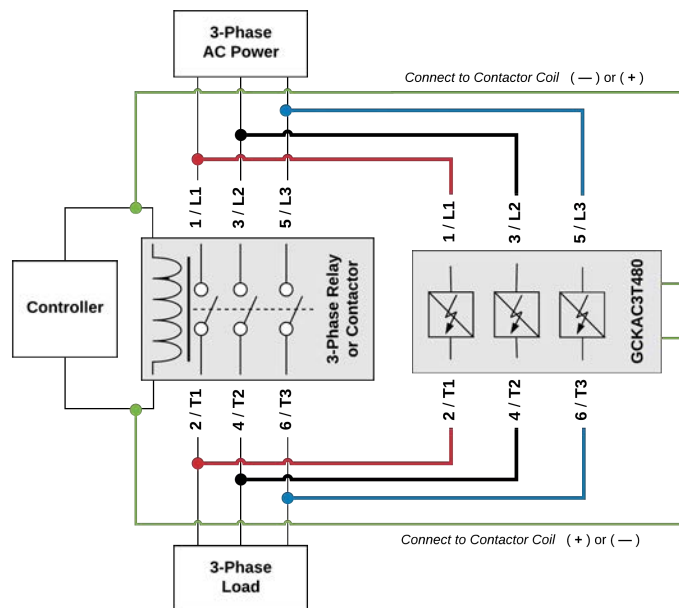
SYSTEM WIRING

The NOsparc arc suppressor connects in parallel across each respective contact of a three-phase AC power relay or contactor, and a separate connection to the relay or contactor's (AC or DC) Coil.

Each arc suppression phase has two terminals (6 total).

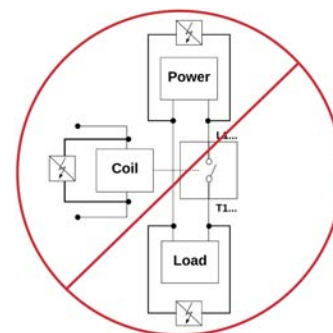
The coil connection also has two terminals.

In order to provide effective arc suppression, the wires between the NOsparc arc suppressor and the relay or contactor contacts and coil terminals should be as short as possible. One foot or less of wire length is ideal; lengths over 3 feet are NOT recommended.



Above: General wiring diagram showing NOsparc in relation to overall system.

Left: Diagram contact and coil connection wiring of NOsparc GCKAC3T480 and a three-phase contactor.



Above: **IMPROPER** NOsparc wiring across LOAD, across POWER, and across COIL.

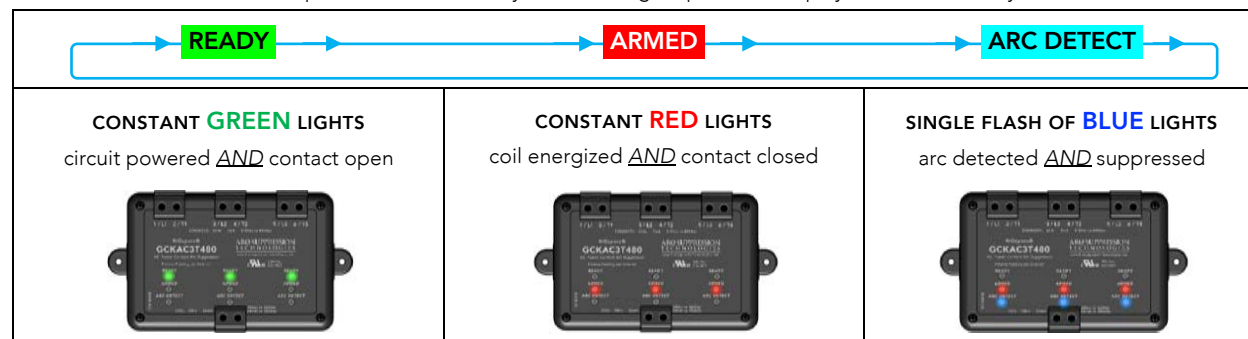
If longer cable lengths are needed, then the wire gauge must be increased according to the following recommendation based on the length of wire between NOsparc arc suppressor terminals and the contact terminals:

- #12AWG up to 24in of wire
- #10AWG up to 36in of wire

LED INDICATOR LIGHTS

The GCKAC3T480 has three indicators for each contact: "READY" (green), "ARMED" (red), and "ARC DETECT" (blue).

NORMAL OPERATION of the product is indicated by the following sequence of displays as the contact cycles:



Light patterns other than those shown above indicate either improper installation or product malfunction. Kill main power prior to troubleshooting or replacement of an installed GCKAC3T480 (see "WARNINGS" on page 2 of this User Manual).