



User Recommendations for 321 Bottom Fire Detonator

DET-3050-321

MAN-DET-321 (R05)

*Please check Owen website at
www.corelab.com/owen/ to confirm latest revision of User Manual*

OWEN OIL TOOLS

12001 Cr 1000
Godley, Texas, 76044, USA
Phone: +1 (817) 551-0540
Fax: +1 (817) 551-1674
www.corelab.com/owen

Warning: use of owen equipment contrary to manufacturer's specifications or operating instructions may result in property damage, serious injury or fatality. If you are not trained in the handling and use of explosive devices, do not attempt to use or assemble any owen perforating systems or owen firing devices.

This technology is regulated by and, if exported, was exported from the united states in accordance with the export administration regulations (EAR). Diversion contrary to U.S. Law is prohibited. Export and/or re-export of this technology may require issuance of a license by the bureau of industry and security (BIS), U.S. Department of Commerce. Consult the BIS, the EAR, and/or Owen Compliance Services, Inc. To determine licensing requirements for export or re-export of this technology.

This document contains confidential information of Owen Oil Tools LP (Owen) and is furnished to the customer for information purposes only. This document must not be reproduced in any way whatsoever, in part or in whole, or distributed outside the customer organization, without first obtaining the express written authorization of owen. This document is the property of owen and returnable upon request of Owen.



TABLE OF CONTENTS

1.0 - Firing Resistorized Bridge Detonators	4
2.0 - Arming	4
3.0 - Frequently Asked Questions	6



Warning: *Explosives are destructive by nature! Do not attempt to disassemble or alter the detonator in any manner! Do not crush, hammer, pinch, impact, pull wires, or abuse the detonator or any explosive.*

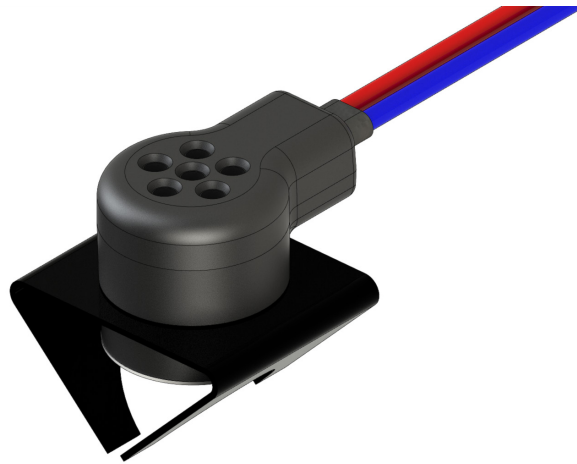


Warning: *Be sure to follow safe operating practices as found in API RP-67 in accordance with governmental regulations, company policies, and manufacturer's recommendations!*

Owen Oil Tools' Resistorized Bridge Detonators are designed to detonate when an electrical current greater than 0.2 amps is applied. The 321 Bottom Fire Detonator is a resistorized electrical detonator manufactured to API RP-67 recommendations and employs a 51 Ohm resistor in the firing circuit. It is designed to be used in hollow steel carrier or scalloped gun systems where a fluid sensitive detonator will prevent the detonation of a "flooded" gun when used properly. Fluid migrating through the top fluid holes in the body of the detonator will desensitize the powder around the resistor and prevent the detonator from achieving a high order detonation. The 321 Bottom Fire Detonator is intended to be used with 80 grains/foot or 40 grains/foot detonating cord in operating conditions up to 350° F for 1 hour while still maintaining its 99.99% initiation reliability @ 95% confidence. The following DynoNobel Fireline detonating cords types are compatible with the 321 Bottom Fire Detonator:

- 80 gr/ft PETN
- 80 gr/ft HMX
- 80 gr/ft HMX LS
- 80 gr/ft RDX
- 80 gr/ft RDX LS
- 80 gr/ft RDX LS XHV
- 40 gr/ft RDX LS Ribbon & Round

The user should satisfy themselves, as to the suitability of this product for the user's application. Please refer to the Owen Oil Tools' "Technical Specifications" sheet (Owen Document # DET-3050-321-DS) for more information.



1.0 Firing Resistorized Bridge Detonators

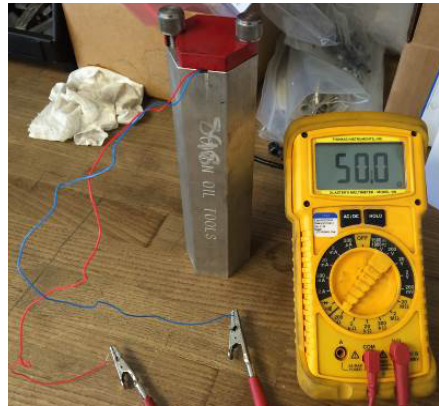
- 1.1 When ready to fire a gun or detonator downhole, increase the power to the firing circuit from 0 to the 1.0 Amp rheostat position and hold at 1.0 Amp position, if necessary, until the detonator fires.



Note: *The user should see the current and voltage levels rise when power is applied. The current will “break” and go to 0 Amps when the detonator has fired.*

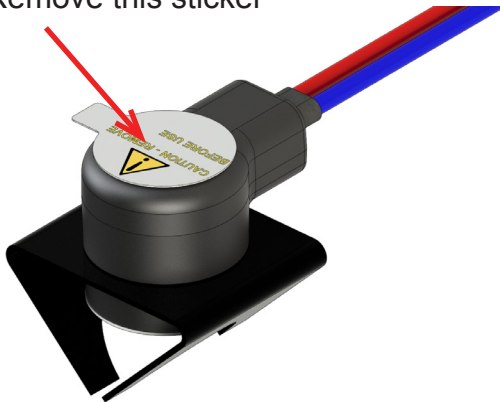
2.0 Arming

- 2.1 Make sure the panel is safe, key is removed and outside the unit, and verify no voltage is measured on the wireline.
- 2.2 Remove the 321 Bottom Fire Detonator (P/N DET-3050-321) from its packaging, insert the detonator into a detonator safety tube (P/N DET-2000-000) with the lead wires extending out from the tube, and secure the safety tube lid shut. The resistance may be checked at this time with a blasters multi-meter and should measure 51 Ohms \pm 2.5 Ohms.

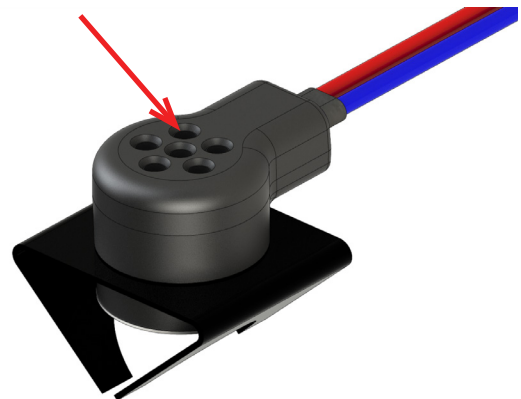


- 2.3** With the detonator still in the safety tube, electrically connect the detonator lead wires to the wireline cable. The detonator is now electrically armed, and may now be removed from the safety tube.
- 2.4** The detonator will have a top sticker with the words “Remove Before Use”. REMOVE THIS STICKER! It is normal to see minor dusting of powder on the adhesive side of the sticker. This will not affect the detonator’s functionality or performance

Remove this sticker

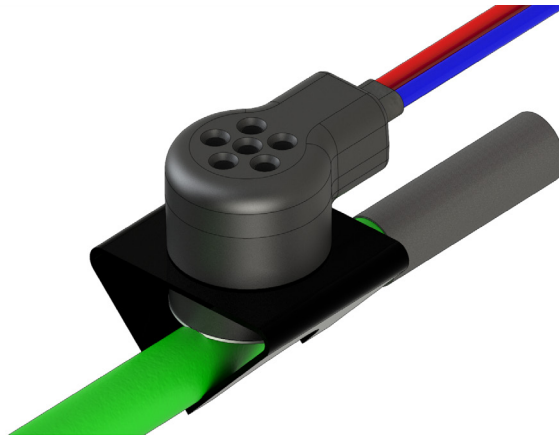


Fluid Desensitization holes



- 2.5** Install the detonator onto the detonating cord by sliding the end of detonating cord through the detonator’s clip approximately 2 - 3 inches as shown in the below figure. This will ensure the detonator on a section of the detonating cord where no voids occur in the cord.
- 2.6** Once the detonating cord is feed through the clip, cover the cut end of the detonating cord with tape prior to assembly into the port sub. This will prevent the detonator from sliding off the detonating cord. The detonator is now ballistically armed, and the finished product should look something like the figure below.

- 2.7 Ensure that the fluid holes on top of the detonator are not filled or covered by non-explosive powder, tape, etc. as this could prevent the detonator from being fluid sensitive.



- 2.8 Complete the mechanical assembly of the device and tool assembly while taking care not to force, pinch, crush, or impact the explosive components or wiring.

3.0 Frequently Asked Questions

Can the 321 Bottom Fire Detonator be used with ribbon or flat type detonating cord?

- Yes, the 321 Bottom Fire Detonator is compatible with RDX based ribbon or flat detonating cord. Please reference pg. 2 of this User Manual for compatible detonating cord types.

Is the 321 Bottom Fire Detonator interruptible?

- No, the 321 does not have the ability to be ballistically interrupted for armed transport. Please do not attempt to interrupt the detonator with custom alternative methods as this is not compliant with regulatory shipping regulations nor API RP-67.

What amperage will these detonators fire at?

- The 321 Bottom Fire Detonator has an “All-Fire” rating of up to 1.0 Amp. The nominal firing current level for the detonator is approximately 0.75 Amps. At elevated temperatures near 300°F or higher, the firing current level will decrease to approximately 0.6 Amps. Owen recommends that the user continue to apply power until a break in the current reading is observed. This break will indicate that the detonator has fired, and power can no longer be applied through the wireline.



User Recommendations for 321 Bottom Fire Detonator

Can the 321 Bottom Fire Detonator be used in either positive or negative polarity?

- Yes, the detonator may be attached to the wireline in either positive or negative polarity. The detonator's functionality is independent of the flow of current (positive or negative) through the wireline

What resistance will the detonator measure?

- When the detonator lead wires are attached to a Blaster's Ohm Meter, the 321 resistorized detonator will measure approximately 51 Ω . Always insert the detonator into a safety tube (Owen P/N DET-2000-000) when checking resistance!

Can the 321 Bottom Fire Detonator be "Dump Fired"?

- Yes, the 321 Bottom Fire Detonator can be "dump fired" where the current rate is applied at an almost instantaneous rate. However, power should continue to be applied until the detonator fires and current can no longer be applied.