

EBS
10579 FM 1954
Wichita Falls, TX 76310
940-691-1005 Office
940-761-3371 FAX

IDENTITY AND USE OF EBS SWITCHES

EBDD (DIODE SWITCH)

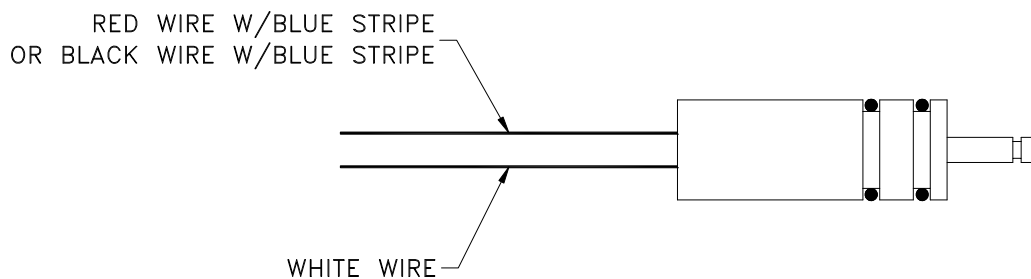
Hard wired dual diode switch. Full function can be checked with a meter or shooting panel. White wire connects to through wire in gun (through circuit), black or red wire (according to polarity preference) connects to detonator of upper gun. Lower gun circuit connects to pin on downhole end of switch.

This switch is designed to control two guns or first two guns of multiple gun string.

Only one dual diode switch can be used per gun string.

Polarity designation

- EBDD-P (Positive First) black wire (w/blue stripe) to upper detonator
- EBDD-N (Negative First) red wire (w/blue stripe) to upper detonator
- White through circuit wire designates dual diode from pressure switch
- Rating: 350° F (450° F available) @ 15,000 psi for 1 hour



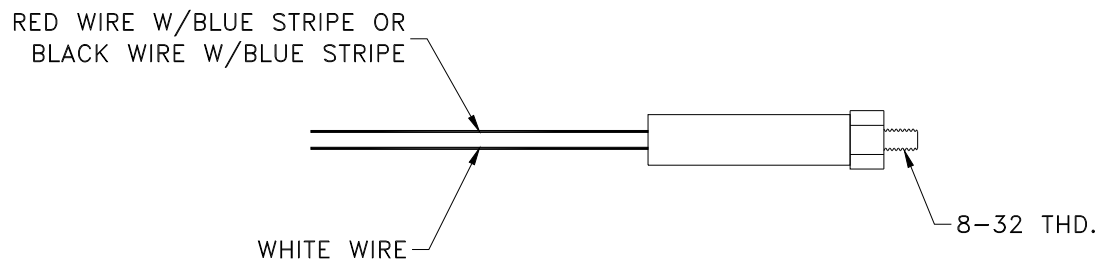
EBPS (DIODE SWITCH)

Hard wired dual diode switch. Full function can be checked with a meter or shooting panel. White wire connects to through wire in gun (through circuit), black or red wire (according to polarity preference) connects to detonator of upper gun. Lower gun circuit connects to threaded stud on downhole end of switch. This switch provides efficient method for combining setting tool with gun.

Only one dual diode switch can be used per gun string.

Polarity designation

- EBPS-P (Positive First) black wire to upper detonator
- EBPS-N (Negative First) red wire to upper detonator
- White through circuit wire designates dual diode from pressure switch
- Rating: 350° F for 1 hour

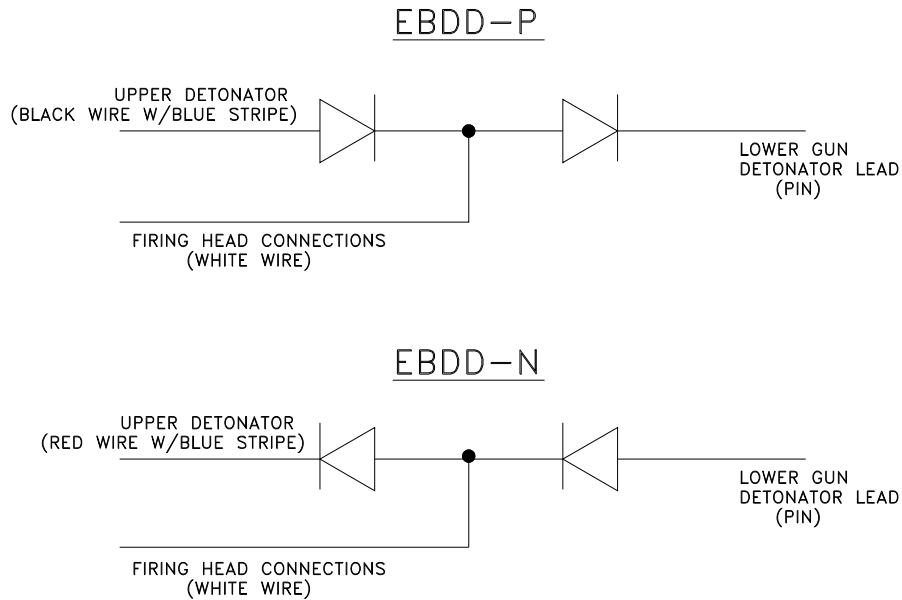


DUAL DIODES

Dual diodes, being hard wired internally, need no outside influence to arm either gun.

We recommend dual diodes when only two guns are to be fired, when hole depth may require firing upper gun instead of lower gun, and for the first two guns of any selective gun string.

The Dual diode schematic is shown below. Only one dual diode switch can be used per gun string.



P-100 (POSITIVE PRESSURE SWITCH)

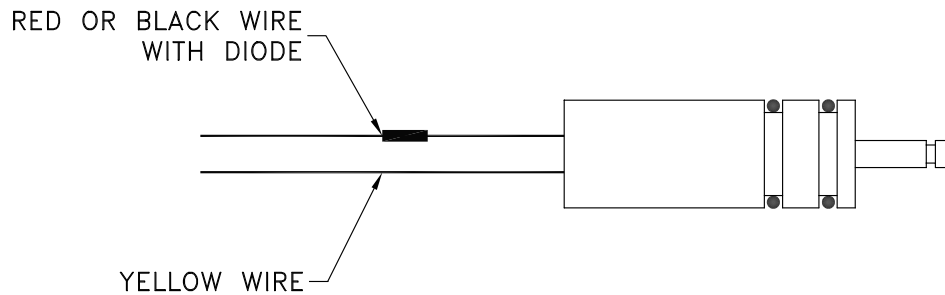
Select fire positive switch. Red wire with diode and yellow wire. Yellow wire connects to through wire in gun (though circuit), downhole pin continues through circuit to lower gun or guns, and red wire connects to detonator. Red wire is open until gun below switch detonates. Detonator wire diode blocks NEGATIVE –DC current from detonator but passes POSITIVE +DC current to detonator.

Rating: 350° F (450° F available) @ 15,000 psi for 1 hour

N-100 (NEGATIVE PRESSURE SWITCH)

Black wire with diode/plain yellow wire. Select fire negative switch. Connects same as P-100 above with exception that switch blocks POSITIVE +DC current and passes NEGATIVE –DC current to detonator.

Rating: 350° F (450° F available) @ 15,000 psi for 1 hour

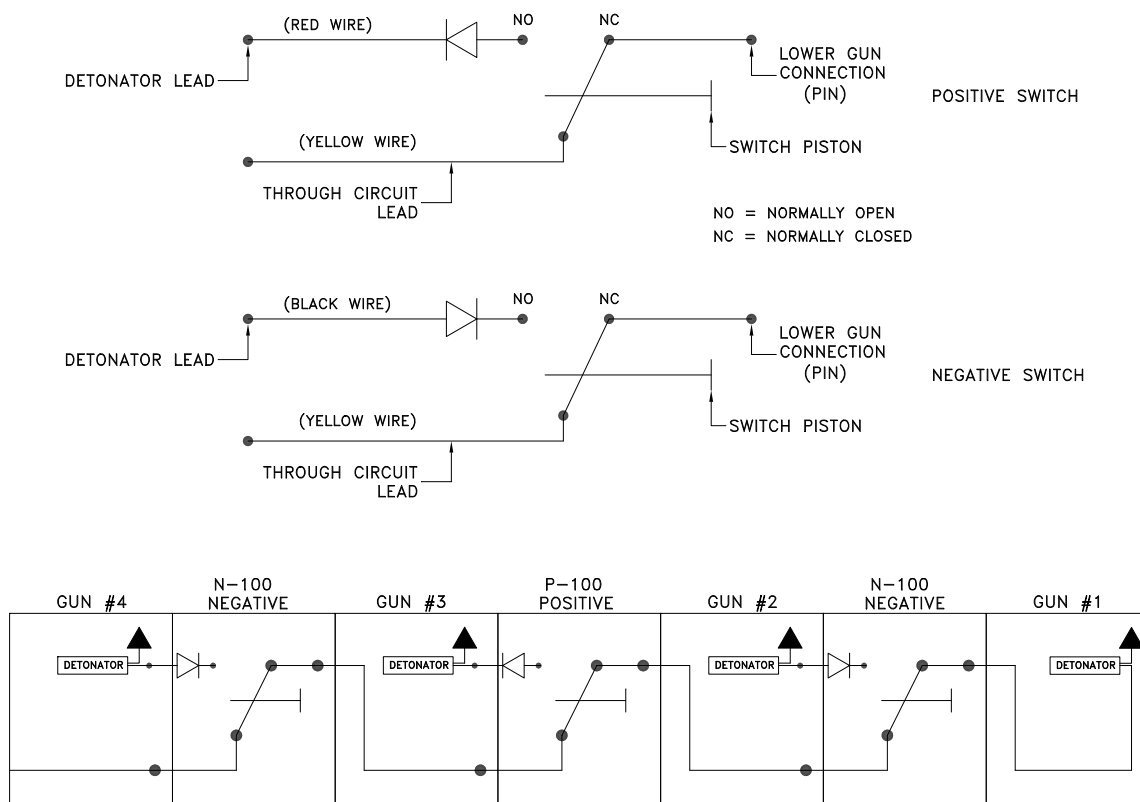


PRESSURE SWITCHES

Our multi-carrier select fire system allows shooting any number of random length guns with one trip into the well. Length and number of selections are limited only by rig height, cable head strength, wellbore deviation, etc.

Disposable, polarity discriminating switches provide selective firing control. The Pressure switch schematic is shown below.

Pressure switches are actuated by the shock wave from charges and detonating cord in the carrier below the switch. A patented hydraulic function differentiates between pressure from a flooded gun and blast pressure. This feature prevents a leak from arming guns out of sequence.



PRESSURE SWITCH LOADING PROCEDURES

Begin loading by inspecting switch sub. Switch bore should be clean and free of debris. Check passage for wires as well. Switch should fit freely into bores up to O-Rings.

Unwind switch wires and feed them through sub body. While holding slight tension on the wires to prevent slack, insert switch body up to O-RINGS. A light coat of grease on body and o-rings will help sealing and switch removal. Using any tool that pushes on steel body, gently push or tap switch body home in bore. DO NOT HIT OR PRESS ON PIN. THIS WILL ACTIVATE SWITCH. Pay particular attention that switch wires do not become pinched behind switch body.

Pinched or twisted wires are the most common cause of problems.

Connect yellow wire on uphole end of switch to through circuit of gun and connect Red or Black wire with diode to insulated leg of blasting cap. Downhole pin continues through circuit to lower gun. As each sub and switch is made up, we recommend using a blasting meter to check continuity through firing circuit. This helps to identify and locate any problems immediately, rather than right before or after going downhole.

When loading guns it is helpful to mark them plainly as Positive or Negative, depending on the switch used. Red and black paint on the port plugs, charge scallops, or switch subs, has worked well for this. We identify the polarity of the switch by which polarity it will pass to a blasting cap after it functions. THE SWITCH DOES NOT DISCRIMINATE POLARITY ON THROUGH WIRE. It is important that the operator be aware of the layout and sequence of his guns.

All guns with switches must be fired with DC (direct current). Any AC (alternating current) will fire all guns at once. The first or bottom gun must be fired with the opposite polarity of the switch above it.

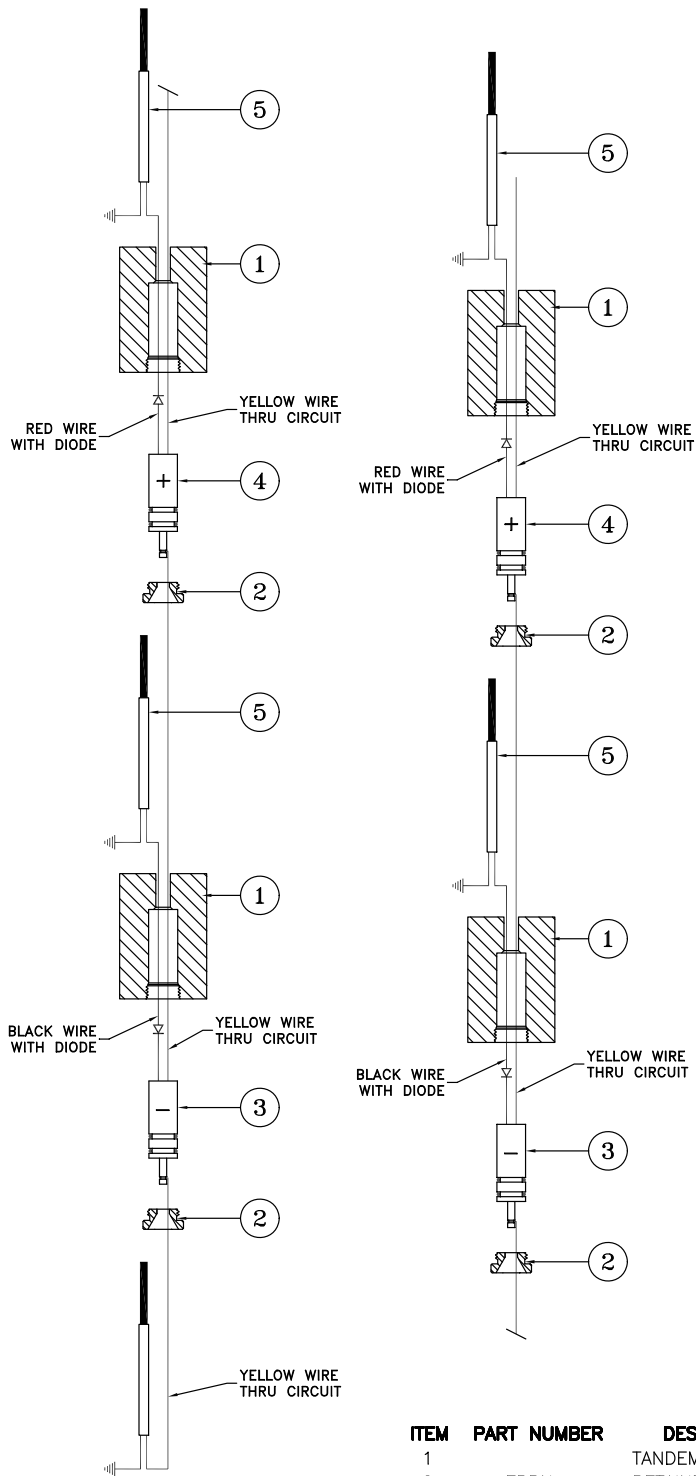
In the event of a misfire, after following all company SAFETY POLICIES, break off last fired gun and check circuit through remaining gun sting. After circuit is established, connect bottom gun circuit to pin and continue perforating. Be especially careful to note polarity of gun above switch.

Care and attention in loading and assembly will ensure good performance in the field.

Feel free to call if you have any other questions or problems.

Joel Sansing, Manager

EBS PRESSURE SWITCH WIRING DIAGRAM



ITEM	PART NUMBER	DESCRIPTION
1		TANDEM SUB W/E-B SWITCH GLAND
2	EBRN	RETAINER NUT (EBS)
3	N100	E-B SWITCH (NEG.) (EBS)
4	P100	E-B SWITCH (POS.) (EBS)
5		DETONATOR

E B and Titan Part Numbers for E B Switches

Dual Diode

<u>EB Part No.</u>	<u>Titan Part No.</u>
EBDD – P 350°	TW-EBDD-P
EBDD – N 350°	TW-EBDD-N
EBDD – P 450°	TW-EBDD-P-450
EBDD – N 450°	TW-EBDD-N-450

Plug Shoot (Dual Diode)

<u>EB Part No.</u>	<u>Titan Part No.</u>
EBPS – P 350°	TW-EBPS-P
EBPS – N 350°	TW-EBPS-N

Pressure Switch

<u>EB Part No.</u>	<u>Titan Part No.</u>
P-100 – P 350°	TW-P100
N-100 – N 350°	TW-N100
P-100 – P 450°	TW-P100-450
N-100 – N 450°	TW-N100-450

Retainer Nut

<u>EB Part No.</u>	<u>Titan Part No.</u>
EBRN	TW-EBRN