"BULLET PROXIMITY SWITCH"
FOR DIVIDER BLOCK LUBRICATION SYSTEMS

PATTON®
DIVIDER BLOCK SYSTEMS
Pro-Tecting "Your" Compressor

ELIMINATES PHANTOM COMPRESSOR SHUTDOWNS IN COLD WEATHER & HIGH PRESSURE APPLICATIONS

The new design of the "BULLET" proximity switch is the *#1 choice for installation on compressor divider block systems.*

"BULLET PROXIMITY SWITCH"

UL
E521351
CLASS I, DIV I, GR. ABCD
CLASS II, DIV I GR. EFG

MADE IN THE U.S.A

"2 YEAR WARRANTY"

Part # PLP-BPS

SPECIFICATIONS:

- 5 Amp 24 Vdc - SPST N/O
- One-Piece S.S. Construction
- Permanent Magnets
- Operating Temp -4°C + 85°C
- Pressure Rating 4500 PSI

FEATURES:

- Triple Magnets Eliminate Contact Chatter in High Vibration & High Pressure Applications
- No Springs to Break
- 316 S.S. Construction
- Epoxy Encapsulation

PATTON DIVIDER BLOCK SYSTEMS
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Patton Divider Block Systems
1004-B South Midkiff Rd.
Midland Texas 79701

BUILT TANK TOUGH
2-Year Factory Warranty

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WHY AM I HAVING NO-FLOW SHUTDOWN ISSUES?

PATTON DIVIDER BLOCK SYSTEMS
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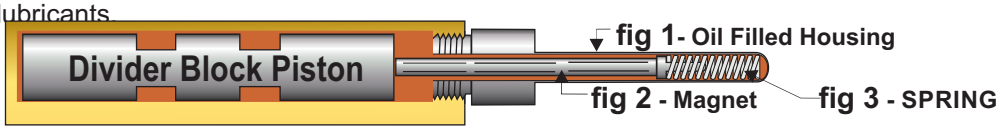
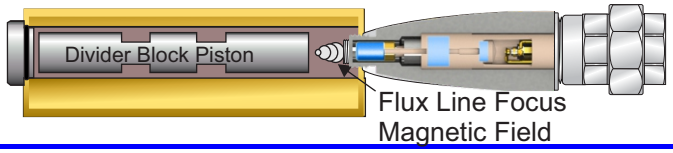
THE PROBLEM:
The compressor industry has been plagued with premature/phantom shutdowns in cold weather or when the compressor is operating at high discharge pressures. Many of these issues are directly attributed to the current design of the oil filled, spring loaded proximity switch used in all digital no-flow devices in the compressor industry.

FAILURE OF PROXIMITY SWITCH IN COLD WEATHER: The spring actuated proximity switch filled with oil (fig.1), when the divider block piston slides the magnet (fig. 2) into the housing, the oil behind the magnet is forced back into the divider block with each piston cycle. When ambient temperature drops to a specific range, the cold oil in the magnet housing causes the divider block to build pressure, will not allow the magnet to be pushed into the housing and the excessive pressure blows the rupture disc causing the compressor to shut down on lube no-flow. The same scenario can take place when using high viscosity lubricants.



BROKEN SPRING IN PROXIMITY SWITCHES?
Manufacturing issues with defective springs may be the problem but, divider block systems in high pressure applications (over 1600 psi) "MUST" have all injection points balanced to eliminate piston slap in the divider block. When the divider block system is not balanced, the divider block piston will slap hard against the magnet, over compressing the stainless spring, which will cause the spring to collapse and break prematurely (fig. 3)

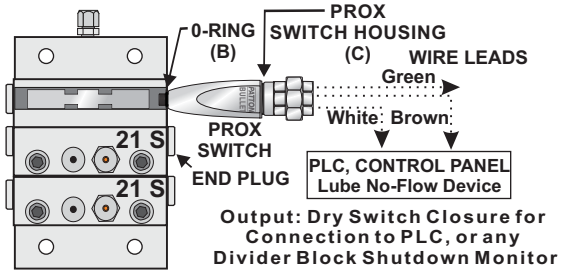
SOLUTION & OPERATION – "PATTON'S FIELD SENSITIVE BPS "BULLET" PROXIMITY SWITCH
Fluid flow in the divider block moves the piston within magnetic range of the housing end, which causes the Magnet 1 to travel forward. The forward movement separates magnet 2 from magnet 3, closes the contacts, sending a switch closure to the PLC control panel. Patton's "Field Sensitive Proximity Switch" (**BULLET**), is designed for use with all divider block systems and is not affected by oil temperature, oil viscosity and does not use springs.



Part# PLP- BPS

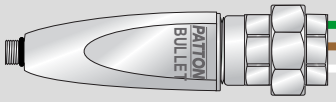
E521351
CLASS I, DIV I, GR. ABCD
CLASS II, DIV I GR. EFG

INSTALLATION:
1.Remove end plug (A) from divider block where proximity switch will be installed.
2.Ensure 0-ring (B) is in place on switch housing (C).
3.Install switch on any available divider block section, left or right side.
4.Torque to 6 foot pounds max, **DO NOT OVER TIGHTEN!**
5. **CAUTION**: Switch Must Not come in contact with the divider block piston. If the piston hits the end of the proximity switch, the force will cause premature failure of the switch!



WIRING INSTRUCTIONS FOR BULLET PROXIMITY SWITCH

Bullet Proximity Switch



Green Wire is Ground Wire "Ground to Conduit"

White Wire Switch Closure Output

Brown Wire Switch Closure Output

To Monitor Switch Closures, Connect White & Black Wires to The Proper Terminals On The PLC or No-Flow Shutdown Device

DO NOT OVER TIGHTEN:
Maximum Torque: 6 Foot Lbs.

CAUTION:

***Support All Conduit & Connections To Eliminate Excess Weight on Switch!**

***Do Not tighten conduit connections to the switch when installed on the divider block. Switch will be over tighten & cause it to fail!**

***Stepping on or pulling on the conduit can bend the proximity switch body & cause the switch to fail!**

DO NOT CONNECT GREEN GROUND WIRE TO BLACK OR WHITE WIRES!

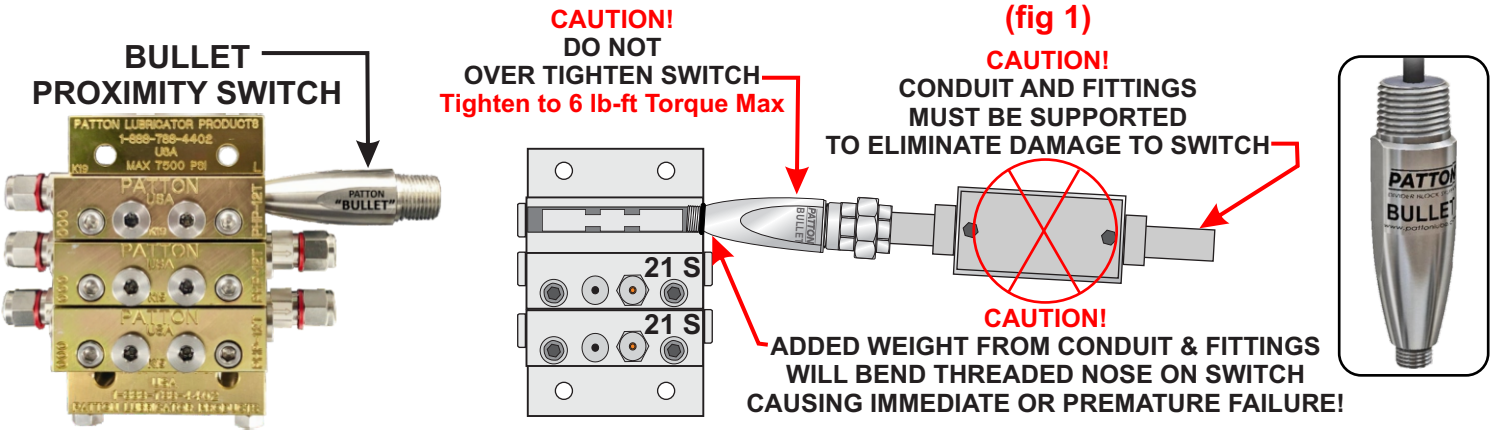
DO NOT LEAVE BARE WIRES EXPOSED!

Troubleshooting Guide For "BULLET PROXIMITY SWITCH"

PATTON® DIVIDER BLOCK SYSTEMS

PROBLEM	POSSIBLE CAUSE	SERVICE PROCEDURE AND/OR CORRECTION
COMPRESSOR HAS SHUT DOWN ON LUBE NO-FLOW **1.** Switch closure indicator on control panel, PLC or lube monitor does not blink. Control panel indicates lube no-flow. LED'S on Patriot switch do not blink. Visual cycle indicator on divider block confirms the divider block assembly and pistons are operating correctly. (Continued On Next Page)	**(1) The Proximity Switch Has Been Over Tightened!** **A.** Switch was over tightened during installation. When the switch is over tightened, the torque stretches the threads on the nose of the switch, damaging the internals, causing failure. Do Not Over Tighten, Torque to 6 lb- ft Max **B.** The switch was installed on the divider block, then the electrical conduit and connections were installed on the switch. As the technician installed the conduit and conduit box, they were tightened to position them in the correct direction for easy access to the wiring. As the conduit was rotated and tightened on the switch, the switch was also rotated and over tightened, causing failure. (see fig 1)	With the divider block cycling, connect the leads of volt/ohm meter to the brown and white wires of the proximity switch. The meter should show continuity or voltage change (on-off) as the divider block cycles. If there is no indication of continuity or voltage, the switch internals have been damaged. **REPLACE THE SWITCH!** To test the new switch after it is installed on the divider block and connected to the control panel, cycle the divider block assembly by SLOWLY pumping clean oil through the system with a purge gun. The volt/ohm meter should display continuity or voltage change with each cycle of the divider block. **CAUTION:** When purging air from the divider block with a purge gun, the operator must always pump oil into the system SLOWLY! ***Rapidly pumping oil into any divider block assembly will cause the pistons to hit the end plugs of the block, damaging the pistons and causing immediate or premature failure of both the divider block and switch.*** **Note**: The proximity switch can be manually tested by touching the nose of the switch to a piece of carbon steel, this closes the internal contacts. As you place the steel on the nose of the switch, listen for a clicking sound of the internals and check for continuity on volt/ohm meter.
	(2) Threaded Nose On The Switch Is Bent! **A.** After the switch was installed on the divider block, the technician installed conduit and a condulet box on the switch. The extended length of conduit and condulet box were left hanging on the switch without support. Vibration combined with the added weight of the condulet box hanging on the switch, caused the threaded nose of the switch to bend, causing failure. (see fig 1) **B.** Conduit and electrical box were installed on the switch and left hanging in the air without support. The conduit was pulled on, or stepped on bending the threaded nose of the switch, causing failure. (see fig 1)	Remove the switch from the divider block, lay it on a flat surface and slowly roll it paying attention to the threaded nose. As you roll the switch, (if the nose is bent) it will be obvious. If the nose is bent, the internals have been damaged causing failure. **REPLACE THE SWITCH!** To test the new switch after it is installed on the divider block and connected to the control panel, cycle the divider block assembly by SLOWLY pumping clean oil through the system with a purge gun. The volt/ohm meter should display continuity or voltage change with each cycle of the divider block. **Note**: The proximity switch can be manually tested by touching the nose of the switch to a piece of carbon steel, this closes the internal contacts. As you place the steel on the nose of the switch, listen for a clicking sound of the internals and check for continuity on volt/ohm meter.

(fig 1)



Troubleshooting “BULLET" Proximity Switch Continued:

PROBLEM	POSSIBLE CAUSE	SERVICE PROCEDURE AND/OR CORRECTION
COMPRESSOR HAS SHUT DOWN ON LUBE NO-FLOW **1.** Switch closure indicator on control panel, PLC or lube monitor does not blink. Control panel indicates lube no-flow. LED'S on Patriot switch do not blink. Visual cycle indicator on divider block confirms the divider block assembly and pistons are operating correctly.	**(3) Divider Block Piston Hit The Nose of The Switch Causing Failure!** **A.** When divider block systems are operating against excessive differential pressures between the lubrication points, the pistons in the divider blocks will bounce back and forth rapidly hitting the end plugs of the block and the nose of the switch. **B.** Operator connected a purge gun to the divider block to pre-lube and purge the divider block system of air. When the lever on the purge gun is pumped rapidly, a large volume of oil is quickly forced into the divider block causing the pistons to hit the ends of the divider block end plugs, and any switch that is installed in the assembly. *CAUTION: Rapidly pumping oil into any divider block assembly will cause the pistons to hit the end plugs of the block, damaging the pistons and causing immediate or premature failure of both the divider block and switch.*	With the divider block cycling, connect the leads of volt/ohm meter to the brown and white wires of the proximity switch. The meter should display continuity or voltage changes (on-off) as the divider block cycles. If there is no indication of continuity or voltage, the switch internals have been compromised. **REPLACE THE SWITCH!** To test the new switch after it is installed on the divider block and connected to the control panel, cycle the divider block assembly by SLOWLY pumping clean oil through the system with a purge gun. The volt/ohm meter should display continuity or voltage change with each cycle of the divider block. **CAUTION:** *Rapidly pumping oil into any divider block assembly will cause the pistons to hit the end plugs of the block, damaging the pistons and causing immediate or premature failure of both the divider block and switch.* When purging air from the divider block with a purge gun, the operator must always pump oil into the system SLOWLY! **Note**: The proximity switch can be manually tested by touching the nose of the switch to a piece of carbon steel, this closes the internal contacts. As you place the steel on the nose of the switch, listen for a clicking sound of the internals and check for continuity on volt/ohm meter.
COMPRESSOR CONTINUES TO RANDOMLY SHUT DOWN ON LUBE NO-FLOW, WITH NO OBVIOUS CAUSE **2.** The Compressor Continues to Experience Erratic or Phantom Lube No-Flow Shutdowns. Switch closure indicator on control panel, PLC or lube monitor is blinking indicating normal operation of the system. Visual cycle indicator confirms the divider block system is operating correctly.	**A. Faulty Wiring From Switch to Control Panel** Wiring in conduit is breaking contact or grounding to conduit. **B. Control Panel** Control panel has issues with firmware/hardware. **C. Air in The Oil Supply** (1) Oil level in crankcase is too high. (2) Oil level in crankcase is too low. Both scenarioes,1 & 2 will introduce air into the system causing erratic compressor shutdown or blown rupture discs. **D. Gas in The Divider Block System** Gas has migrated into the divider block system due to leaking check valves. Note: Gas in the divider block system will cause erratic compressor shutdown or blown rupture discs.	**A.** Disconnect the wires from the switch at the control panel and connect a volt/ohm meter to the wires. The meter should displays continuity or voltage (on-off) as the divider block cycles. If the meter displays voltage or continuity, with each cycle of the divider block, the switch is good. **B.** Test control panel for correct functionality per manufacturers instructions. **C. Proper Crankcase Oil Level is Critical!** **(1) The Oil Level In Sight Glass Is Too High:** The oil level in sight glass should be slightly over the halfway mark with the compressor running. When the crankcase is overfilled with oil, the rotating crankshaft can contact the oil causing it to foam. Then the oil pump forces the frothy oil with air into the system. **(2) The Oil Level In The Sight Glass Is Too Low:** If the oil level in the compressor crankcase is too low, the oil pump can create a vortex and pull air into the pump. Then the oil pump forces the oil with air bubbles into the divider block system causing the lube pump and divider block pistons to air lock. **Note: Proper Crankcase Oil** **(1)** The oil level in the sight glass should always be slightly over the halfway mark when compressor is running. **(2)** The oil level should be at the top of the sight glass when the compressor is shutdown. **D.** Use a heat gun to check the temperatures of all check valves. Check valves with extreme elevated temperatures are leaking gas into the system. **Note:** You can identify a leaking check valve by touch, a leaking check valve is much hotter to the touch.

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