Divider Block Instructions

The SLS Lubrication system divider block is designed to split and meter fluid flow in a positive displacement lubrication system. The divider block meters fluid by volume and ensures accurate delivery of fluid against varying back pressures to a number of locations.

Specifications

Part numbers: SB-D-XXX
NOTE: mechanical ATEX certification, excluding any part number containing "MPS" which is electrical.

Pressure ratings: All models: 7500 psi (51.7 MPa, 517 bar)

Maximum speed: 240 Cycles / minute

Environmental: -15°F – 158°F (-26°C - 70°C)

Connections:		
	SB-D-Top-XXX:	1/4" NPT inlet
		1/8" NPSF outlet
	SB-D-Bottom-XXX:	1/8" NPSF inlet
		1/8" NPSF outlet
	SB-D-Baseplate:	1/8" NPSF outlet

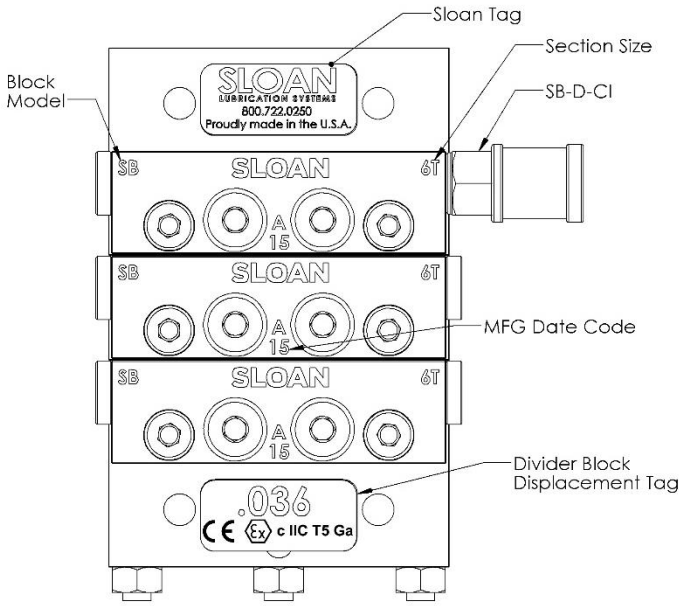
Wetted Materials: Carbon Steel, Stainless Steel, Fluoropolymer Elastomers (PTFE, Viton), Nitrile Elastomers (Buna)

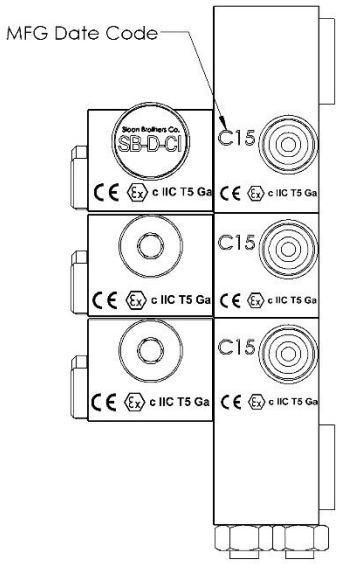
Product Classification: CE Ex c IIC T5 Ga

For technical support, contact:
Sloan Lubrication Systems
168 Armstrong Drive
Freeport, PA 16229
+1 412-828-2420

Use this product only for its intended purpose. Improper use or failure to follow these instructions may compromise protection provided by this equipment.

Identification





Warnings

	**Skin injection hazard** Occurs when fluid under pressure is lost through a small pin hole on the fluid transfer device or surrounding tubing. The force causes the fluid to penetrate rapidly beneath the skin entering the tendons and deep tissue of the hand or body. The injection may be a small painless pin hole or there may only be a stinging sensation, however fluid injected directly into the blood vessels can spread rapidly through the circulatory system. **Seek medical attention IMMEDIATELY.** Risk mitigation measures: • Do not attempt to identify the source of a leak with your hands • Always point the dispensing device away from the body or anyone nearby. • Do not attempt to stop or deflect a leak with any part of the body, even while using gloves, tools, or rags. • Ensure all fluid connections are secure before operating the equipment • Do not use components that appear to be incorrect, damaged, worn, or rusted. • Follow the ***Pressure Relief Instructions*** prior to servicing or cleaning equipment.

	**Fire and Explosion Hazard** An explosive atmosphere is a mixture of a dangerous substance or substances (gas, mist, dust or vapor) with the air, which has the potential to catch fire or explode. When not properly controlled, these substances can cause harm as a result of a fire, explosion, or similar incident. Risk mitigation measures: • Avoid potential ignition sources of the dangerous substances such as cigarettes, open containers of solvents, solvent soaked rags, electrical heaters. • Avoid or minimize release of dangerous substances • Control releases of dangerous substances at source • Avoid adverse conditions (such as exceeding pressure/temperature limits) that could lead to danger • Ground all equipment in the work area. **If static electricity is identified, immediately turn off equipment and verify grounding by using a digital volt meter.** • Ensure surfaces of all equipment are kept clean of excess fluid or dirt
	**Protective Equipment** The hazards addressed by protective equipment are physical, chemical, and airborne particulate matter. Wearing the appropriate personal protective equipment (PPE) in the work area will help prevent eye injury, hearing loss, and inhalation of airborne particulate matter. Personal Protective Equipment includes but not limited to: • Protective eyewear and hearing protection while servicing, inspecting, or cleaning equipment. • Respirators, gloves, and protective clothing when working directly with fluids and solvents.

Pressure Relief

Divider blocks may remain pressurized after operation. Before performing maintenance or removing any parts from the assembly, pressure must be relieved from the system to prevent injury due to skin injection, unexpected contact with fluids, or moving parts.

Follow these steps to relieve pressure from a divider block.

1. Ensure that fluid flow to the divider block is stopped.
2. If system is equipped with downstream bleed valves, open them and check system pressure gauges to ensure that pressure has bled off.
3. If there are no downstream bleed valves, slowly open each tube fitting on the divider block outlets.

NOTE: Always ensure that a pressure relief device is installed upstream of a divider block to prevent accumulation of excess pressure.

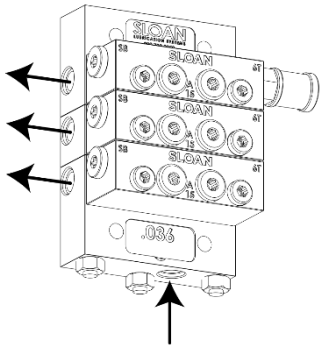
Installation

NOTE: The divider block must be installed in a location that is readily accessible to personnel during normal operation. The divider block should also be mounted perpendicular with the ground.

CAUTION: Prior to installation, setup, or use, these instructions should be thoroughly reviewed and understood by both maintenance technicians and operators.

Divider blocks are intended to be installed downstream of a pump, a pressure relief device such as rupture disc or relief valve, and a high-pressure filter. A 10µm filter is recommended.

All divider blocks should be mounted to a flat, stable surface and in the upright orientation. Avoid locations with extreme temperatures and hard to reach areas preventing access for maintenance or replacement. Where possible use a divider block mounting bracket or spacers to raise the assembly off of the equipment to which it is attached.



When designing a divider block system, follow the “up-and-out” rule. In general, tubing and piping should be arranged so that any entrained air or gas can flow upwards and be carried out of the system. The divider block should be mounted above the pump and below the delivery points whenever feasible.

The largest cause of improper divider block operation is fluid contamination. This contamination comes in 3 major forms: Air, Debris, and Water.

- Ensure that the supply of fluid being pumped is free of air. Avoid using day tanks pressurized with air or other gases. If the fluid supply to the pump is expected to contain entrained air, consider using an air trap or intermediate tank to allow sufficient time for the gas to settle out.
- Debris or particulate in the fluid being divided will decrease divider valve life. Size filters accordingly for fluid condition and expected component life.
- Water will rapidly affect the uncoated steel components inside a divider block. As the piston to bore fit is extremely close, any corrosion will impair functionality and eventually prevent the pistons from moving altogether. Always ensure a clean supply of fluid. Follow proper fluid storage and transfer teqhniques to prevent condensation in daytanks.

Start-up

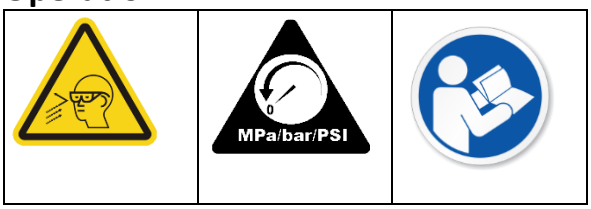
To ensure trouble free start-up of equipment after installation or maintenance, purge supply and delivery lines of air prior to operation. This eliminates any air or gas in the lines and flushes any debris out of the lines that could cause problems.

Loosen the supply fitting to the divider block and operate pump until a clean, air free supply of fluid is observed at the block inlet. Reconnect fitting and continue operating pump until fluid is observed at each delivery point.

If secondary blocks are installed downstream of a divider assembly, ensure that each secondary supply fitting is removed before continuing to purge after reconnecting the supply to the primary block.

The system pumps may be operated by another piece of equipment or may be locked out at the time of commissioning. In this case, a separate air or manual purge pump may be used to speed the process. The procedure in this situation remains the same.

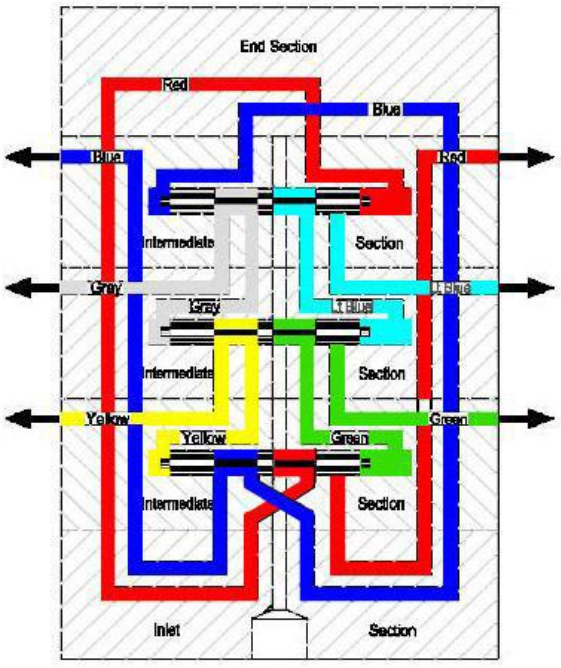
Operation



Overview

The SB divider valve assembly is an extremely accurate metering device. Each section is individually machined and each piston is match-fit to ensure an extremely tight piston to bore tolerance. The divider assembly uses a “series progressive” cycling principle. It operates as follows:

The fluid flow from the pump can only move one piston at a time. When that piston moves, it displaces a set volume of fluid to its designated lube point. The piston movement also opens the system’s flow to move the next piston, which makes the next delivery. This cycle repeats itself. In this manner, every line must receive its prescribed amount in turn before the next line can deliver. Each delivery of fluid to an outlet is guaranteed and can be accurately monitored.



Note that each piston can make a delivery out each side of its section. Those outlets can be internally combined together as well (this is the difference between a **S**ingle and a **T**win divider section). The volume of each delivery depends on the section’s piston size and internal porting.

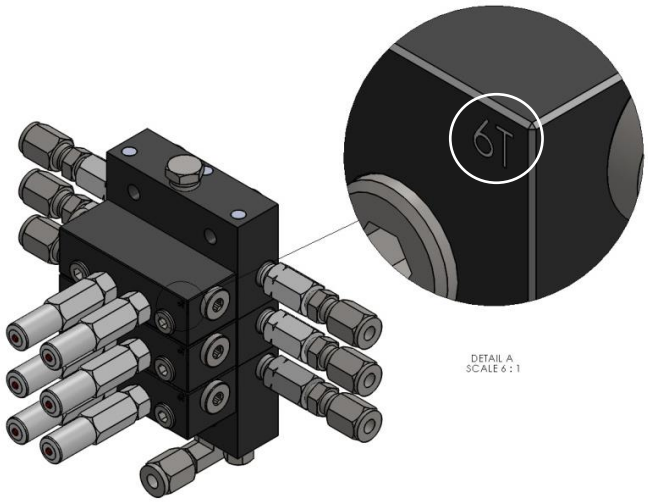
All lines can potentially receive the same or different amounts depending on their respective piston sizes. Each divider block has been designed for each specific application, so take care to locate the feeds as tagged. These feed rates and locations are tagged on the panel and are shown on your operational schematic.

In many systems, one primary divider valve feeds several secondary valves where many oil lines are required. Always refer to the system operational schematic for your specific divider valve arrangement.

Flow Rate Measurement

How to determine the total displacement of a divider assembly.

Each section is engraved with a number designating the piston size. This represents the displacement in thousandths of a cubic inch. For example, a 6T section represents a 0.006 cubic inch displacement. To determine the total volume of a divider assembly, add up all the numbers, multiply by 2, and divide by 1000.



As an example, a four section block with sections 12T, 12T, 6T, and 6S has a displacement of 0.072 in^3.
(12 + 12 + 6 + 6 = 36 x2 = 72 / 1000 = 0.072)

Each complete divider assembly shipped from Sloan contains a tag with the pre-calculated total displacement. See page 2.

How to calculate the current flow rate based on the cycle time.

The cycle time is the number of seconds it takes for a block to move from any valve position back to that same position. Start a timer when the visual cycle indicator begins to move in one direction and stop the timer once the indicator begins to move in that same direction again. If the block does not have a cycle indicator mounted, there may be a flashing light or other indicator on an electronic monitoring device. Using the calculated displacement determined above, multiply by 3000 and divide by the cycle time. The result is the flow rate in pints per 24-hour period (PPD).

$$\frac{(displacement) \times 3000}{cycle\ time} = flow\ rate\ (PPD)$$

How to calculate the cycle time required to deliver a specific flow rate.

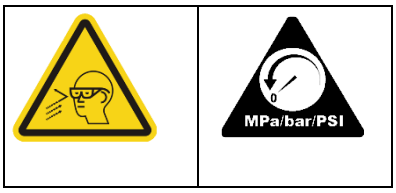
Using the calculated displacement, multiply by 3000 and divide by the desired flow rate. The result is the cycle time, in seconds, that the block must have to deliver the required amount of fluid. To meet that flow rate, adjust the pump up or down until the cycle time is correct.

$$\frac{(displacement) \times 3000}{flow\ PPD} = cycle\ time\ (Sec)$$

The constant in the formulas above is 3000. The explanation below shows how the constant is derived.

1 day = 86400 seconds; 1 pint = 28.875 in^3 $\frac{86400}{28.875} = 2992.2$ *(rounded to 3000)*

Maintenance



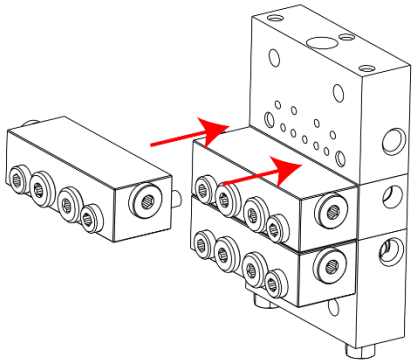
Annual inspection (or 8,000 operating hours)

- Replace all divider block assemblies with tested spares.
- Test rigs must be verified. If they cannot generate and hold the required pressure, they need to be repaired.
- Blocks are to be tested to factory guidelines specified in the *SB Divider Book*. Any individual piston sections that do not pass the pressure test need to be replaced.
- There are 2 pressure characteristics that need to be tested.
    - The first test is a cycle pressure test. This test determines how much pressure needs to be generated to cause the pistons to move against atmospheric pressure. This verifies that the piston is able to move freely within the block.
        - Completely purge the block with lightweight hydraulic oil (ISO 46) and then pump slowly, watching the pressure gauge on the pump. Any reading under 500 PSI is acceptable.

    - The second test is a bleed down test. This test determines how much oil can leak back along the length of the piston at pressure. This test verifies that the piston to bore clearance is still within limits. If the clearance becomes too large over time the divider block can no longer deliver its oil at pressure, instead the oil can “bypass” or bleed back to a lower pressure delivery point.
        - Place a test cap is placed on the bottom right outlet of the divider block.
        - Operate the pump until the pressure has climbed to 3000 PSI.
        - Stop the pump and start a timer for 1 minute.
        - If the pressure drops less than 500 PSI, the section being tested is good.
        - If the pressure never reaches 3000 PSI or the block bleeds down greater than 500 PSI, that section must be replaced.
        - Release the pressure and move the cap to the next outlet and repeat.
        - Each outlet must be tested in this manner.

Replacing a piston section

- Follow pressure relief instructions to ensure no residual pressure remains in system.
- Remove any accessories attached to the section and set them aside.
- using a 3/16” allen wrench, remove the section from the baseplate.
- Inspect the baseplate for debris or O-rings left behind.
- Remove the new section from packaging and check that all O-rings are installed and in good condition.
- Check to make sure the new and old sections have a matching size and type engraving. (Ex: 18T or 09S)
- Using the new screws included with the section, reattach the section to the baseplate. Tighten both screws hand tight.
- Tighten both screws to 85 in-lbs. using a torque wrench.
- Reinstall the accessories removed in the first step.
- Cycle the block to purge any air and ensure proper functionality.

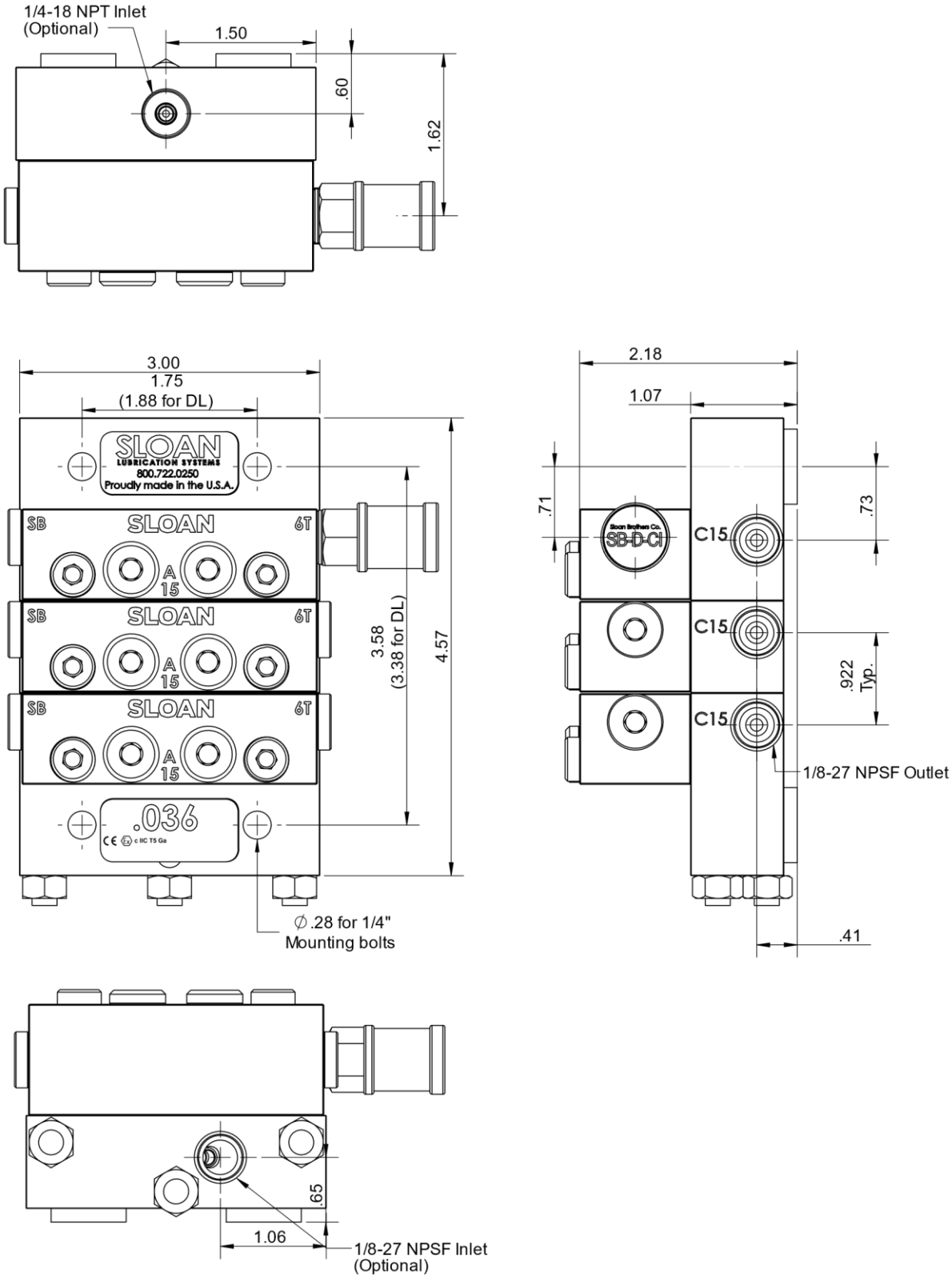


NOTE: There are no user serviceable components **inside** the divider piston sections. Do not attempt to disassemble the divider block beyond the piston sections, or remove any pistons from the sections in an effort to repair or recondition. Disassembly or modification so may result in unexpected failure. Pistons are match fit to each individual section and not interchangeable between sections.

Troubleshooting

Symptom	Possible Cause	Action
Divider Block does not cycle	Blockage downstream of the divider	Inspect lines downstream of divider
	Pump has stopped working	Inspect and troubleshoot pump
	Contamination in fluid	Replace divider sections, ensure clean fluid supply
	Leakage upstream of the divider	Inspect tubing and piping between pump and divider block
	Accessory has malfunctioned	Check installed accessories for damage and proper operation
Divider block cycle time is erratic	Defective pump	Inspect pump
	Inadequate supply to pump	Check fluid supply
	Divider block piston dragging	Check for contamination and test
	Gas present in the system	Purge system
Divider Block cycle pressure is erratic	High differential discharge pressure	If over 2000 psi, then install balancing valves
	Divider block piston sticking	Check for fluid contamination and pressure test
	Divider blocks bypassing	Pressure test divider block; replace failed sections
	Leaking check valve	Inspect check valves down stream of divider block
	Divider piston section bolts over torqued	Torque divider piston section bolts to 85 in-lbs.
Divider Block is leaking fluid	Divider piston section bolts under torqued	Torque divider piston section bolts to 85 in-lbs.
	O-ring missing or damaged	Inspect and replace O-rings on sections, baseplates, and plugs
	Improper fitting installation	Check fitting thread type and installation method
Divider block is not delivering fluid in the quantity expected	Wrong divider piston sections installed	Check divider piston section size marking and ensure proper selection for the application
	Piston / bore fit worn	Pressure test divider block; replace failed sections

Dimensions


1/4-18 NPT Inlet
(Optional)
1.50
.60
1.62
3.00
1.75
(1.88 for DL)
SLOAN
LUBRICATION SYSTEMS
800.722.0250
Proudly made in the U.S.A.
SB
SLOAN
6T
A
15
.036
3.58
(3.38 for DL)
4.57
∅.28 for 1/4"
Mounting bolts
2.18
1.07
.71
.73
Sloan Brothers Co.
SB-D-CI
C15
.922
Typ.
1/8-27 NPSF Outlet
.41
.65
1.06
1/8-27 NPSF Inlet
(Optional)

REVISION CONTROL

Rev. #	Date	Description of Revision	Approval(s)
0	02/28/17	Initial Release	Ryan LeFevre, Mike Bechtold, C.J. Sloan

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EU DECLARATION OF CONFORMITY

QAF-25
REV 0

Object of the Declaration:

Products:	*SLS Divider Blocks*
Models:	*SB-D-XXX*
Manufacturer:	*Sloan Lubrication Systems*
Address:	*168 Armstrong Dr., Freeport, PA 16229*

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The object of the declaration described above is in conformity with the relevant Union harmonization legislation:

2014/34/EU	ATEX Directive
2006/42/EC	Machinery Directive

Conformity is declared through compliance to the relevant harmonized standards:

ISO 80079-36:2016	Explosive atmospheres-Part 36: Non-electrical equipment for explosive atmospheres-Basic method and requirements
ISO 80079-37:2016	Explosive atmospheres-Part 37: Non-electrical equipment for explosive atmospheres-Non electrical types of protection constructional safety "c", control of ignition source "b", liquid immersion "k" Basic method and requirements
EN 1127-1:2014	Explosive atmospheres-Explosion prevention and protection
ISO/IEC 17050-1:2004	Suppliers declaration of conformity

Product conformance is declared through the relevant standard:

ISO 9001:2008	Quality Management System

Signed for and on behalf of:

Sloan Lubrication Systems	
Place of issue	Freeport, PA
Date of issue	1/24/17
Place of Technical File Storage	Element Material Technology, Unit E South Orbital Trading Park Hedon Road, Hull, HU9 1NJ, United Kingdom

SIGNED: _____ **TITLE:** Quality Manager