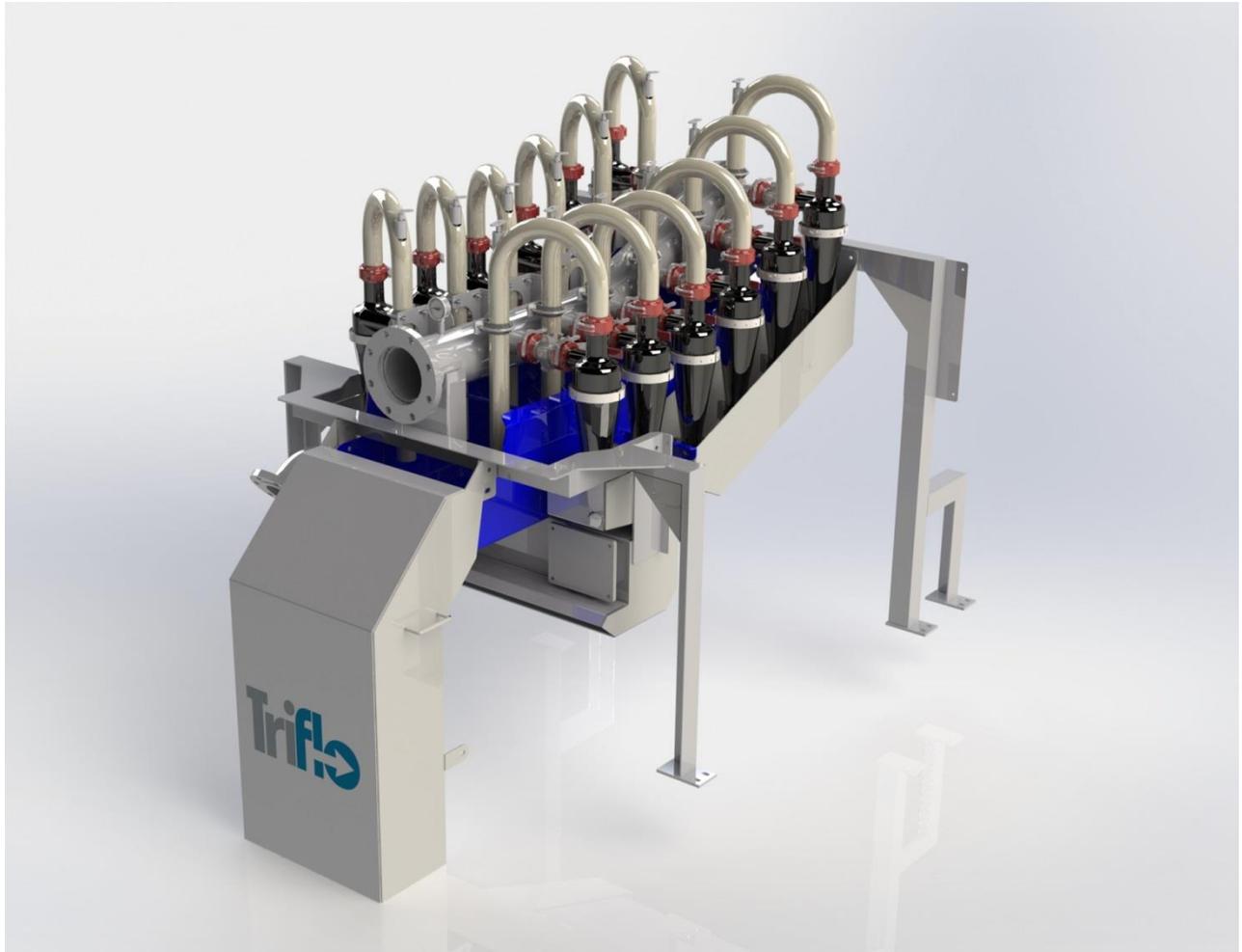




## SERVICE & OPERATING MANUAL

### 12-4S Mud Cleaner ([12-01-095](#))



## INTRODUCTION

The Triflo 12-4S Mud Cleaner is capable of processing up to 780 gallons per minute and can get do to cut point of approximately 35 microns. After processing the Effluent (Clean water) is discharged through the back down comer trough and the solids discharge from the cones are dumped on to the shakers that is operated in addition underneath the Mud Cleaner. This equipment is designed to remove the sand and silt sized particles before they have a chance to break down even smaller.



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The Triflo 12-4S Mud Cleaner is designed to save barite and remove low gravity solids larger than barite from weighted mud system. The Sand/Silt Separator hydro-cyclones will separate the low solid liquid slurry from the barite and larger than medium silt range particles. The barite and larger silt size particles will be directed on the screen surface to save barite and drilling fluid while the large silt size particles will go off the end of the screen.

On the unweighted mud systems the Triflo 12-4S Mud Cleaner paired with a Triflo shaker will reduce the costs by reduced jetting, less chemical replacement and less replacement of water and/or oil. With the use of 325 mesh screens it is possible to remove solids to approximately 25-35 micron silt size particle.

The Triflo 12-4S Mud Cleaner/Shaker combination has several design characteristics that justify its ability to remove sand and silt sized solids from the drilling fluid. The feed manifold is designed to ensure balanced feed pressure into the hydro-cyclones. System balance is achieved by opening or closing individual control valves on each hydro cyclone, by lowering or raising the siphon tubes on each overflow tube, and/or increasing or decreasing the apex bushing size. Any of these adjustments can alter the GPM rate and handle most volume requirements. These adjustments can make particle interference, mud viscosity, and rejection volume less critical and enable the system to work more efficiently. The Triflo 12-4S Mud Cleaner can remove solids that are often found to be the cause of drill collar sticking and wear on mud pump expendables.

## OPERATION

1. The feed slurry of solids and liquid is fed through the inlet at a high velocity obtained by steady pressure of twenty-five (**25-32**) **psi**. The high velocity transmitted to the feed section creates a spinning velocity and resulting centrifugal forces. The vortex finder causes the stream to spiral downward towards the underflow solids discharge. Centrifugal force and inertia causes solids to settle outward toward the hydro cyclone wall, in a downward spiraling stream.
2. The solids separate according to size and weight of the particles. In the density range of solid particles in drilling fluids, size is of far more influence than the variations in density so that basically the biggest particles settle first and fastest.
3. The cone section narrows, inner layers of the downward spinning liquid turn back toward the overflow because of the increasing centrifugal forces near the center.
4. In Triflo's hydro-cyclone, as the last of the liquid moves to the center and back upward toward the overflow, the downward spiraling solids continue out the apex, not being able to turn back because of their greater inertia and high downward velocity. Therefore, the actual solids removal at the underflow is by inertia, not by settling. The underflow rate and density varies with the volume and size of solids being separated to the underflow.
5. The underflow from the fluids, even under extreme conditions, will be approximately 40 GPM and ordinarily under 30 GPM. This makes it possible to use fine mesh screen (150-200 mesh) to clean all of the mud returning from the bore hole. 200 mesh screens have openings of 74 microns and the 150 mesh screens have openings of 104 microns. Theoretically, particles smaller than these opening should remain with the mud and larger particles and would be carried off the end of the shaker.
6. The Triflo 10-4 Mud Cleaner is operated at **25-32 psi** of pressure. A six (6) inch butterfly valve should be placed in the discharge line between the centrifugal pump and the manifold inlet. This valve would be used for adjusting the manifold pressure to **25-32 psi**.
7. Each hydro-cyclone has a two (2) inch butterfly valve located before the feed inlet. This valve permits the operator to turn off each hydro cyclone individually for system balance and removal of the hydro cyclone, without shutting down the entire system.
8. Triflo does not recommend this valve to be used as a flow adjustment and should be either fully open or fully closed.

9. The siphon rod, located on the top of the overflow tubes are an adjustment of the underflow. When the siphon tube is completely down, the air entering the apex bushing is increased and less drilling fluid is permitted to spray out the apex of the hydro cyclone.
10. When a wetter underflow with finer solids is desired, the siphon tube should be raised. This adjustment will reduce the amount of air permitted through the apex and cause a wetter underflow to travel to the shaker screen. The distance the siphon tube should be raised will vary with the drilling conditions and no hard fast rule will apply.
11. The apex nut and apex bushing are designed for easy removal when plugging becomes a problem and are adjustable to permit the required amount of spray discharge desired. When a smaller opening is necessary tighten the apex nut to the desired setting. The tighter the adjustment the less air permitted to enter the bottom of the hydro cyclone. At times when plugging is a problem, the apex nut and the apex bushing can be removed. This may be necessary when drilling a surface hole or when large amounts of sand are present.



Over tightening of the apex nut and apex bushing will cause the hydro cyclone to become plugged. When the hydro cyclone becomes plugged severe erosion will occur in the feed section of the hydro cyclone and may damage the interior of the hydro cyclone. The damage will first be noticed in the zone of maximum wear and may make the hydro cyclone virtually useless.

## MAINTENANCE

1. The Triflo 12-4S Mud Cleaner is a high performance piece of mud equipment and requires a regular maintenance program.
2. Hydro cyclone wear and performance is highly dependent of the feed pressure and the conditions of the hydro cyclones. The pressure should never exceed 32 psi, as more than 32 psi will cause excessive wear on the hydro cyclones. Recommended pressure is between 25 and 32 psi, however this will vary depending on the concentration of solids.
3. Damaged or worn, hydro cyclones will not separate the fine drill solids from the drilling fluid and need to be checked periodically for wear.

## **TROUBLESHOOTING**

**PROBLEM:** Pressure at the manifold too low:

**CAUSE:**

- Is the pump impeller large enough to deliver at least 25 psi?
- Is the pump speed correct?
- Is the supply line from the pump to the manifold six (6") in diameter?
- Is the pump supplying any other piece of equipment?
- Is the supply line to the manifold plugged?
- Is the centrifugal pump suction plugged?

**PROBLEM:** No underflow or too little underflow:

**CAUSE:**

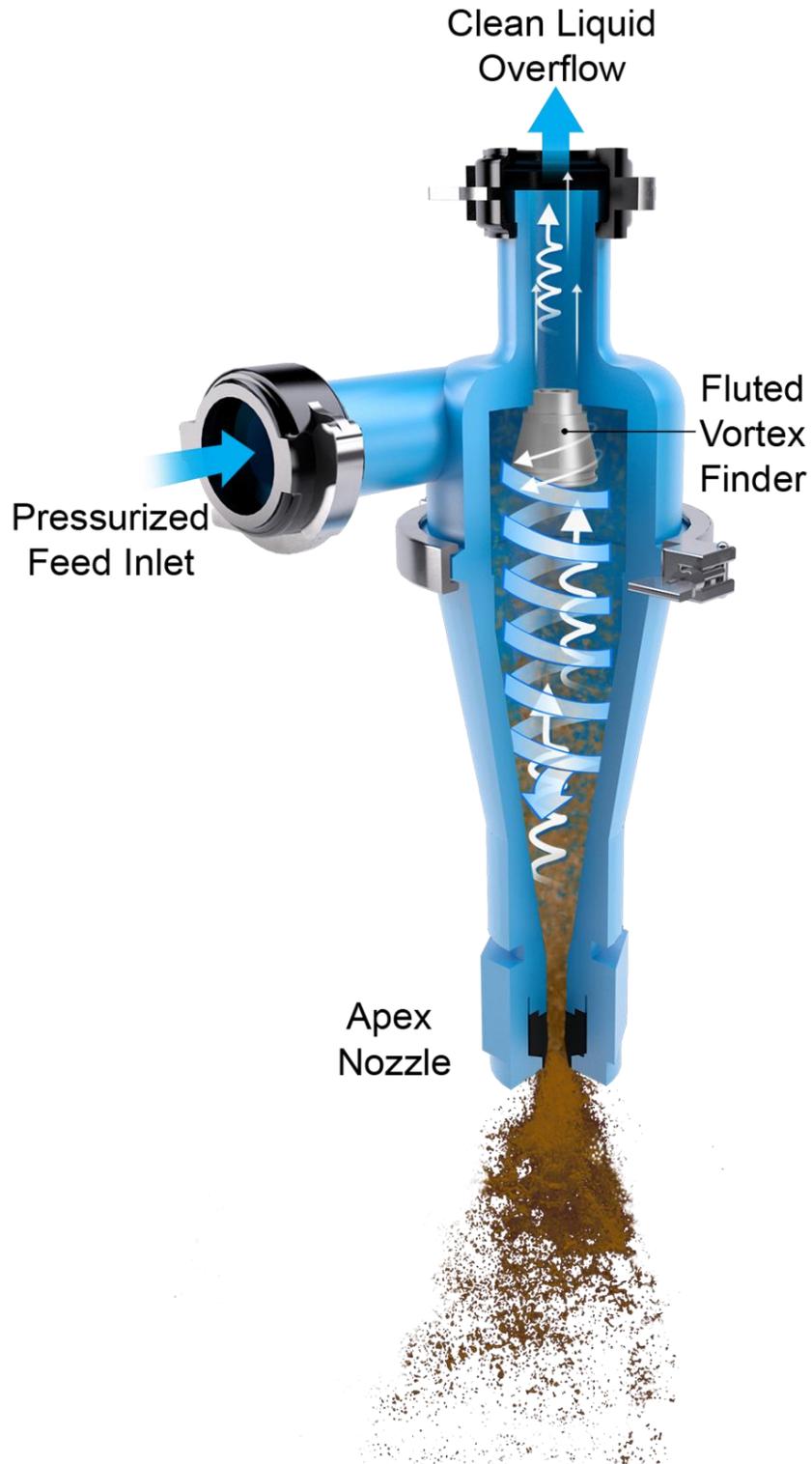
- Is the feed pressure at least 25 psi?
- Is the apex bushing plugged?
- Is the apex bushing closed too tightly?
- Are there fine-drilled solids in the mud?
- Is the valve to the hydro cyclone open?
- Is the pump running?

**PROBLEM:** Too much underflow:

**CAUSE:**

- Is the hydro-cyclone feed section or cone section damaged?
- Is the apex bushing in the hydro cyclone?
- Is the pressure too high?

**DRAWING – SPRAY DISCHARGE OF HYDRO-CYCLONE**





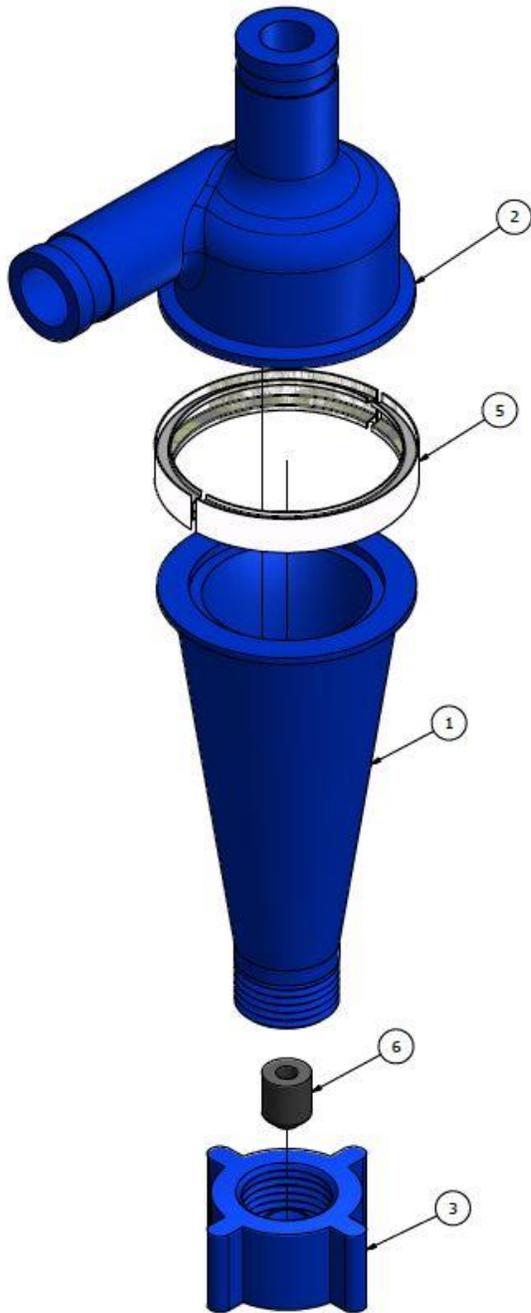
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### RECOMMENDED SPARE PARTS

1. Always order spare parts from TRIFLO INTERNATIONAL, INC.
2. This is particularly true of bearings, which may not be available from the local bearing sources because of the special internal clearance requirements.
3. It is advisable to stock the following spare parts so that breakdowns can be repaired promptly and costly delays eliminated.

### SPARE PARTS FOR ONE (1) YEAR

DESCRIPTION	QUANTITY	TRIFLO PART NO.
Hydro Cyclone Complete 4"	12	03-00-044
Victaulic Coupling 2"	36	00-00-047
Victaulic Gasket 2"	36	00-01-008
Siphon Rod Seals	12	01-00-011
Pressure Gauge	1	02-00-020
Apex Bushing	12	03-00-048
Apex Nut	12	03-00-047



ITEM	PART #	DESCRIPTION
1	03-00-046	4" CONE LOWER
2	03-00-045	4" CONE INLET
3	03-00-047	4" APEX NUT
5	03-00-049	STEEL BAND
6	03-00-048	APEX BUSHING



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**FOR INFORMATION**

**PLEASE CALL TRIFLO INTERNATIONAL AT:**

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**NOTES:**