MAINTENANCE TECHNIQUE

UNDERGROUND DRILL RELIABILITY

[2022]

Dosing Unit Manual

Document	BHS DOSING UNIT	Site	TBD
Client	TBD	Contact	TBD

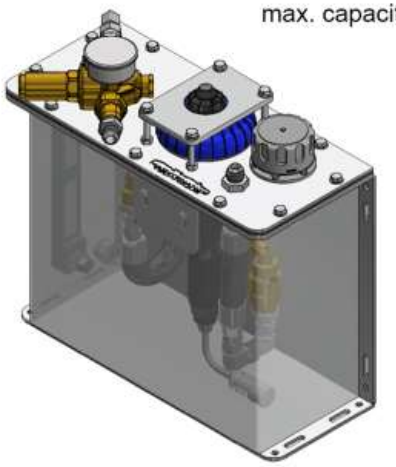
Prepared by:
Gordon Taylor

OVERVIEW

Maintenance Technique supply two MT BHS Dosing units that are suitable for dosing AMC Bore Hole Stabiliser (BHS) chemical into the airmist flushing stream on most long hole drills.
Both modules are identical in function but have different capacities to allow for fitment to different machines.
Modules are available in 23 litre and 40 litre capacities-
Both MT BHS Dosing units contain identical components and operate as follows-
Drill rig water enters via an adjustable pressure reducing valve, this valve is adjusted between 5 – 7.5 bar. The pressure reducing valve contains a fine mesh to filter any contamination from the inlet water and in addition to regulating pressure will also prevent any pressure spikes from the mine water system from affecting the module.
Pressure regulated mine water then enters a water driven chemical dosing pump that will accurately dose BHS chemical between a setpoint concentration of 0.2% to 2%. Units are set at 1.5% from factory as this has shown to produce the most consistent results. Dosed mine water and BHS solution then passes through a one-way check valve to prevent any backflow before exiting from the module to be introduced into the drill rigs flushing system.
See below for dimensions-

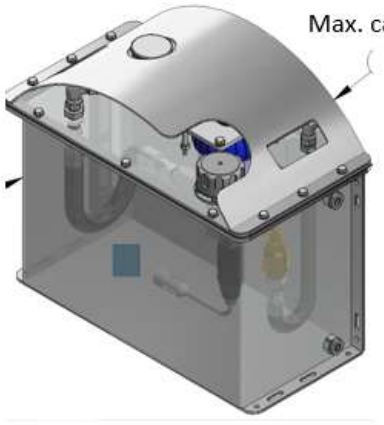
MT4010 05 BH
HOLE STABILIZER
SMALL
Dimensions approx.-
500 x 300 x 500mm tall

max. capacity approx. 23L



MT4010 01BHS
HOLE STABILIZER
MODULE
Dimensions approx.-
500 x 300 x 500mm tall

Max. capacity approx. 40L



COMPONENTS

MT9111 4067 DR

Pressure reducing valve with included gauge

Pressure reducing valve is mounted to the top of the unit and is adjusted with the included 10mm Allen key as shown in pic
Always start with adjuster screwed out and adjust in as water is flowing through unit.

MT9111 4067 DOS

Dosing Pump MT spec

Water powered dosing pump fitted with specially designed chemical resistant seals. Water flowing through the pump which takes up the required percentage of BHS chemical and injects it into the water flow. The design inside the pump then mixes the water and BHS chemical before dispensing to the outlet of the pump. As the pump is powered by the amount of water passing through the pump, dosing accuracy is maintained regardless of changes to flow or pressure providing maximum pressure rating is not surpassed.

MT9111 4067 DC
Check valve water

One way check valve fitted after dosing pump inside module, check valve is full metal construction and is used to prevent any back flow or pressure spikes from downstream damaging the unit.

MT9111 4067 DL
Pressure relief valve
(optional)
Can be added to outlet of stabilizer module to allow excess pressure to be relieved in the case of a blocked bit or other obstruction. (Only required in some circumstances on Sandvik Drills)
Set to 10 bar

MT EMOO 4 VF
Motor seal kit

Kit contains all soft seals in chemical resistant material to rebuild MT 9111 4067 DOS Dosing pump. Instructions to rebuild the pump unit are in the manual page 9.

MTSKD2 5RE2 VF

Seal kit VF

Kit contains lower pump section soft seals in chemical resistant material and hard components that are subject to wear to rebuild MT 9111 4067 DOS Dosing pump lower section. Instructions to rebuild the pump unit are in the manual page 9

MT 9111 4067 DB ½”
MT9111 4067 DV ¾”

Diverter valve water

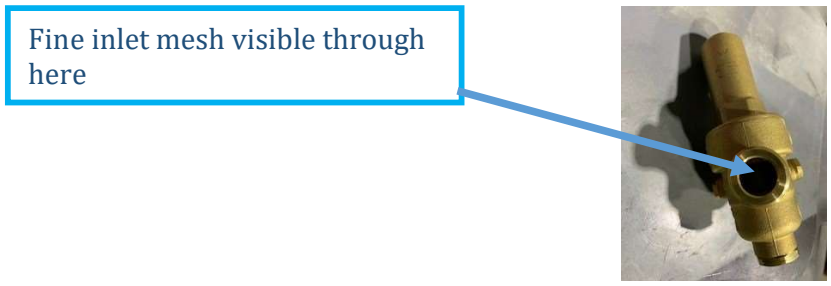
Modules come with “L” Ported diverter valves in either ½”or ¾” to enable the airmist flushing water to be diverted to the hole stabilizer module when BHS dosing is required or around module when BHS dosing is not required.

MAINTENANCE AND TROUBLESHOOTING

FOLLOW ALL SITE REQUIREMENT FOR ISOLATION WHEN WORKING ON THIS EQUIPMENT

Minimal maintenance is required for the system once setup correctly. Dosing module should be cleaned out of remaining BHS chemical after use and fresh water should be flushed through system to remove any residual material. If module stops dosing chemical the following steps should be taken.

1. Check that water is flowing to module, gauge on pressure reducing valve should be reading between 5 and 7.5 bar. If pressure is outside of this range, adjust pressure reducing valve using a 10 mm Allen key. If pressure does not adjust, carefully remove inlet water hose from module and ensure adequate water is flowing to stabiliser module.
2. If water flow to module is adequate and in spec carefully reconnect inlet hose and remove outlet hose from module and see if unit begins pumping water and dosing, If unit does begin flowing water and dosing chemical then there is a restriction or blockage downstream on module that requires repair.
3. If there is adequate water flow into module and no flow of water from module then remove the lid from tank (40 litre unit only) and remove pressure reducing valve. Inside of the inlet of the pressure reducing valve is a fine mesh, check that this is not blocked. Remove blockage if detected. Dosing module should then flow water.



4. If inlet mesh to pressure reducing valve is clear and there is adequate flow and pressure to module then the lid will need to removed from the unit and the check valve after the dosing pump will also need to be checked for any blockages. Once cleared, re-install components and check for water flow through unit again.
5. If module flows water but does not dose chemical, it is likely that the pump is stuck due to BHS chemical having solidified inside pump or the seals inside the pump require replacement. The pump will click whilst dosing which indicates correct function. Even in noisy environments you can feel the pump clicking by placing your hand on the lid whilst it is dosing. If pump is not dosing (clicking) then the pump will need to removed from the unit and disassembled and cleaned and rebuilt with fresh seals.
6. Remove lid from the unit and carefully remove dosing pump from module, dosing pump has plastic threads so care should be taken not to damage any components during removal. Once pump has been removed from unit follow the instructions on page 9 to re-seal pump.
7. Once pump has been resealed and reinstalled into stabiliser module, retest for operation. Pump will click as it operates, this indicates that pump is working correctly and dosing.

Troubleshooting Table

SYMPTOM	CAUSE	ACTION
Pump is not dosing/clicking	Pump, check valve or pressure reducer installed wrong way	Remove lid from module and check all directional valves on components are in same direction as water flow
	Piston locked up	Remove pump from module and ensure piston is not stuck, reset piston by performing steps 28/29/30 on page 16.
	Excessive water flow	Water flow needs to be maximum 2500 litres per hour, reduce flow rate if required and/or remove lid from pump and check o rings on piston valves
	Water blockage	Check pressure reducing valve inlet screen for blockage, check one way check valve for blockage. Ensure there is adequate water supply to module and no restriction to flow after stabiliser module.
	Worn, scratched, scored piston shell or body of pump	Perform piston "fit test" as described in step 14 on page 12.
Water flowing back into BHS chemical inside module tank and overflowing	Check valve in bottom of pump unit is worn, dirty or stuck	Remove, inspect, clean and replace if necessary. See step 9 page 11.
	Body of pump cracked	Remove and inspect pump body
No suction of BHS solution	Piston locked up	Remove pump from module and ensure piston is not stuck, reset piston by performing steps 28/19/30 on page 16.
	Check valve in bottom of pump unit is worn, dirty or stuck	Remove, inspect, clean and replace if necessary. See step 9 on page 11.
	Plunger seal is damaged, swollen or missing	Remove pump and clean or replace plunger seal, if plunger seal is missing it can be a sign that water inlet pressure is too high, decrease using pressure reducing valve.
	Worn, scratched, scored piston shell or body of pump	Perform piston "fit test" as described in step 14 on page 12.
No water flow through unit	Water is diverted to and from module using two L port diverter valves	Ensure valve are positioned correctly to allow water to flow to and from stabiliser module.

The pump unit is capable of dosing between 10 litres per hour and 2500 litres per hour.
Any flow above this level will damage the pump and below this level the pump will not function. If you place your hand on the pump whilst it is running you can count the amount of "clicks" to calculate the water flow through the pump.

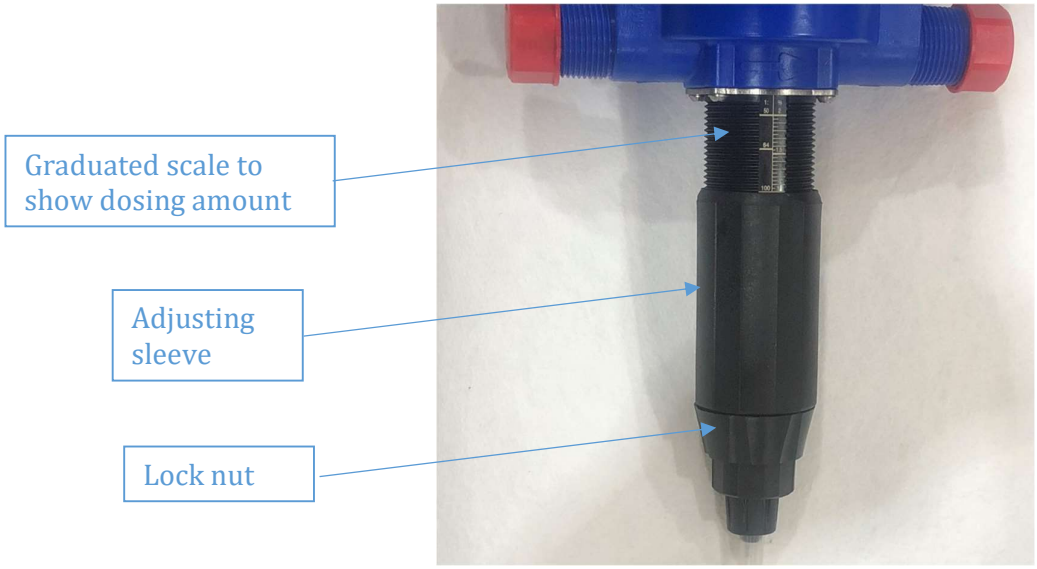
CLICKS PER 15 SECS	LITRES PER MINUTE	LITRES PER HOUR
2	1.8	110
4	3.6	220
18	17	1000
36	33	2000
46	42	2500

Adjusting Dosage rate

Stabiliser modules have the dosing pump preset to dose BHS chemical at 1.5%
This level of dosing has shown to be effective at most operations but can be adjusted if required.

1. The lid and top of the module need to be removed to adjust the dosing rate of the pump- see pic below

2. Loosen lock nut and then screw or unscrew the adjusting sleeve to change the dosing rate



3. Hand tighten locknut and reinstall top of module and lid to stabiliser module

DOSING PUMP MT SPEC REBUILD INSTRUCTIONS MT 9111 4067 DOS

Disassemble Pump Unit

1.Unscrew and remove the lid

2.Place dosing pump upside down and remove the 4 retaining screws using a no.2 screwdriver

3.Pull the injection stem out of main body, this may contain undiluted BHS, it is non-hazardous but messy

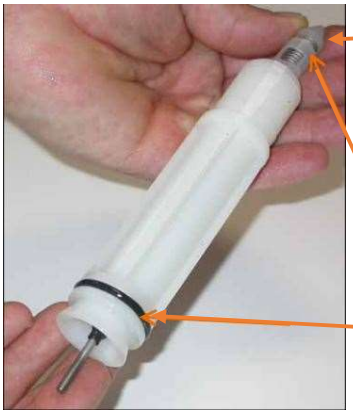
4.Grab the black valve support as shown and pull the piston out of the blue pump body

5.Unscrew and remove the barbed fitting

6. Unscrew and remove the conical nut and anti-friction ring

7.Remove the white injection stem from the top of the black sleeve

8.Carefully remove the sleeve O ring



9.Gently remove the check valve from the injection stem, be careful not to scratch inside of the injection stem

10. Carefully remove the injection stem o ring

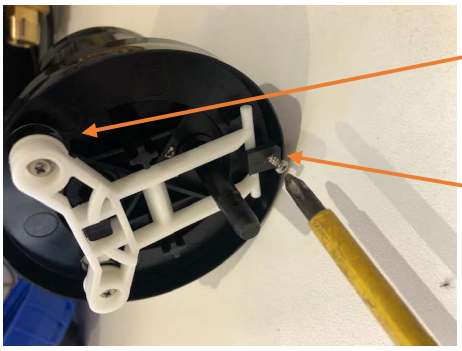
11. At this stage, stop and clean all components in soapy water, do not use solvents such as contact cleaner or degreaser. Inspect all part for wear or excessive scoring before continuing

Disassemble Piston Unit

12. Carefully Remove plunger end seal

13.With plunger seal removed re-insert piston half way down the bore of the pump body

14.Suspend the unit by holding the white valve support only and lift unit up. The piston should be snug in the body and the body should not fall off, if it does the unit should be replaced, if unit passes “fit” test move on to disassembling the piston

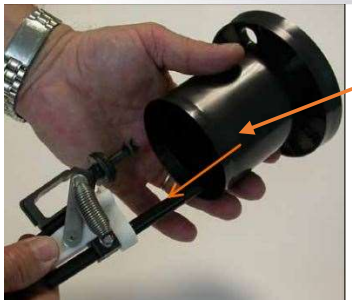


Outlet Valves

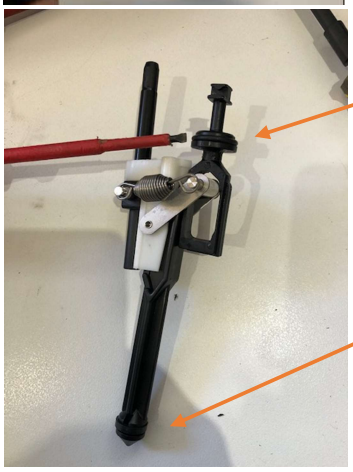
15.Actuate the piston so the valves are in the up position and remove the retaining screw using a No.1 screwdriver

16. Pull the valve support up and slide it back to separate it from the valve

17.Using No.1 Phillips screwdriver remove the 4 retaining screws

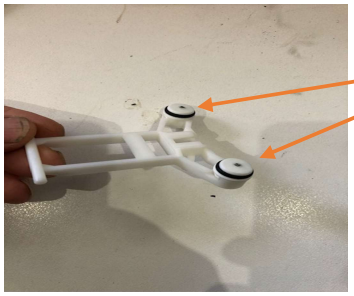


18.Carefully pull the actuator assembly from under the piston shell



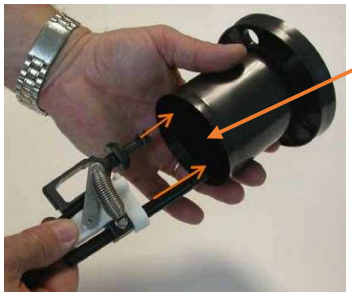
19.Replace Inlet valve o ring

20.Replace Plunger seal



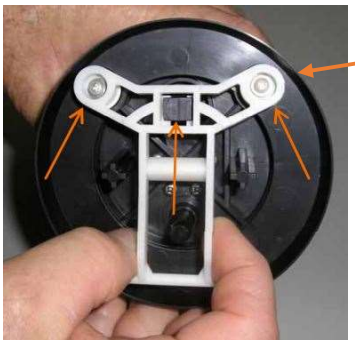
21.Replace outlet valve o rings

22.Replace o ring in bottom of piston

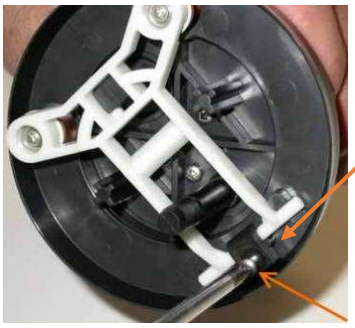


23.Align push rod assembly with corresponding holes in the piston shell and insert carefully into piston shell

24.Align screw holes and install the 4 screws using a no.1 Philips screwdriver

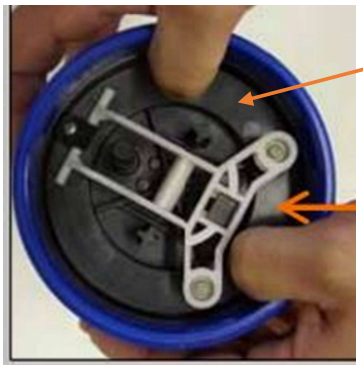


25. Align the top inlet valve with the groove of the center valve support and gently push forward until the outlet valves reach their openings in the piston shell



26.Reposition the valve support retainer and install screw using No.1 Philips screwdriver
Piston is now ready for installation

Reassemble the pumping unit



27.Insert piston into body and push piston all the way down, it may click

28.Pull piston back up to top of stroke, the black rod shown here should be extended

29.Push down on the black extended rod as shown, you should here a distinctive click

30. Repeat this process several times, if unit clicks and valves open and shut each time, piston unit is assembled correctly

31.Replace o ring seal in lid if necessary and screw lid back on Set unit aside.

32.Replace the O ring on the dosing stem

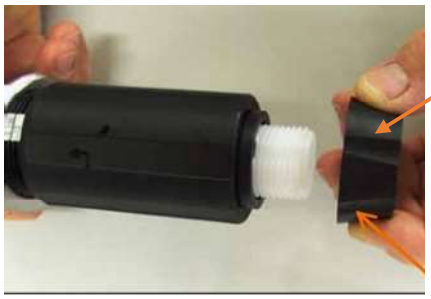
33.Reinsert the injection stem into the injection sleeve, make sure the long groove in the injection stem aligns with the tooth inside the injection sleeve

34.Replace the injection sleeve o ring

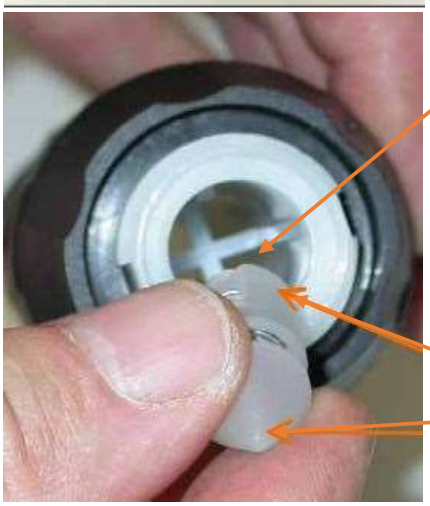
35.Insert the metal retainer

36.Thread the adjusting nut onto injection sleeve until top of nut is at 1.5% mark.

37.Align teeth on anti-friction ring with the 2 grooves in the dosing stem and slide it up to the adjusting nut



38.Thread the conical locking nut onto the dosing stem. It should be hand tight only.



39.Slide the check valve assembly into the injection stem, the cone should point out

40.Remove old seal from barbed fitting and replace with new check valve seal, ensure groove is facing up

41.Thread the barbed fitting onto the injection stem. Hand tight only.

42.Refit white conical washer seal

43.Carefully align the plunger inside the injection stem assembly

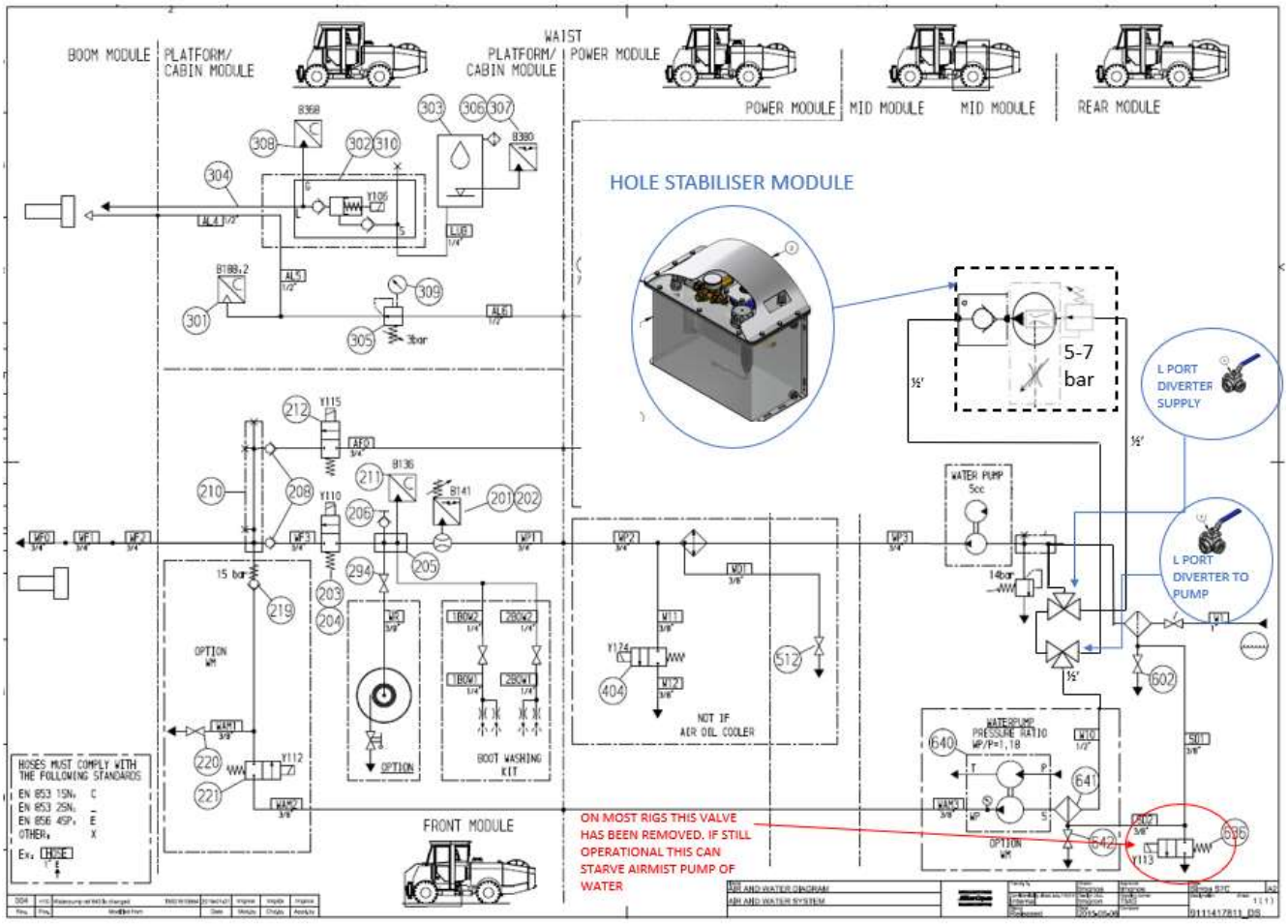
44.Align the metal retaining plate and install the 4 screws using a No.2 Phillips screwdriver.

45.The pump unit is now reassembled and ready to be installed back into the lid of the stabilizer module.

Machine schematics

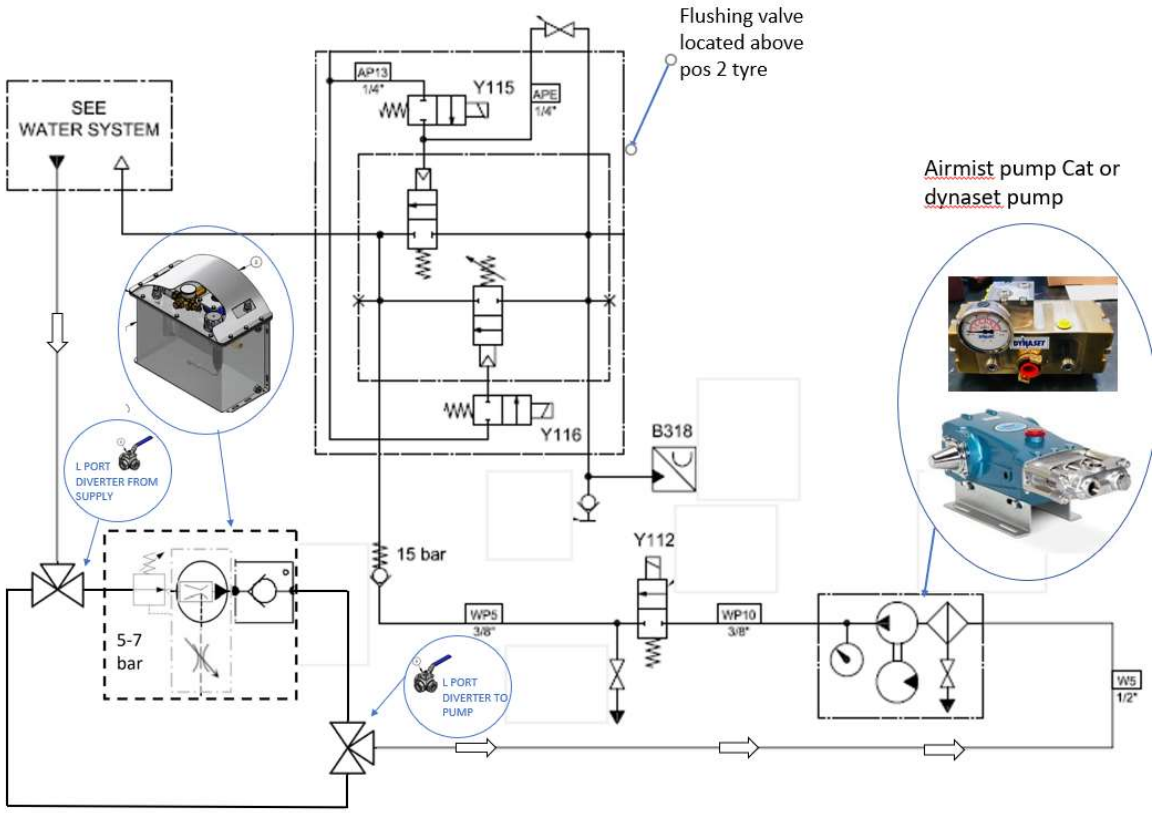
EPIROC S7

Epiroc S7 long hole drills are equipped standard with air mist drilling. Using a Dynaset high pressure pump to add a regulated amount of water to a full air pressure stream delivered via a separate connection at the rear of the rig to the mine air supply. To dose BHS chemical to the water a three way diverter valve is placed before Dynaset pump and when BHS dosing is required the inlet water is diverted to the MT BHS Dosing unit which includes a pressure reducing valve(set to 5 bar) and then through a chemical dosing pump, the chemical dosing pump is an accurate water powered pump that adds between 0.2%-2%(recommended setting 1.5%) BHS solution to the water mix. The homogenized water/BHS solution then passes through a one-way check valve before re-entering the inlet of the Dynaset pump through a second three way diverter valve and being injected into the air stream that is used for flushing. By using 2 separate diverter valves the system is completely isolated from the drill rig when not in use.



EPIROC L6, M6, E7 etc

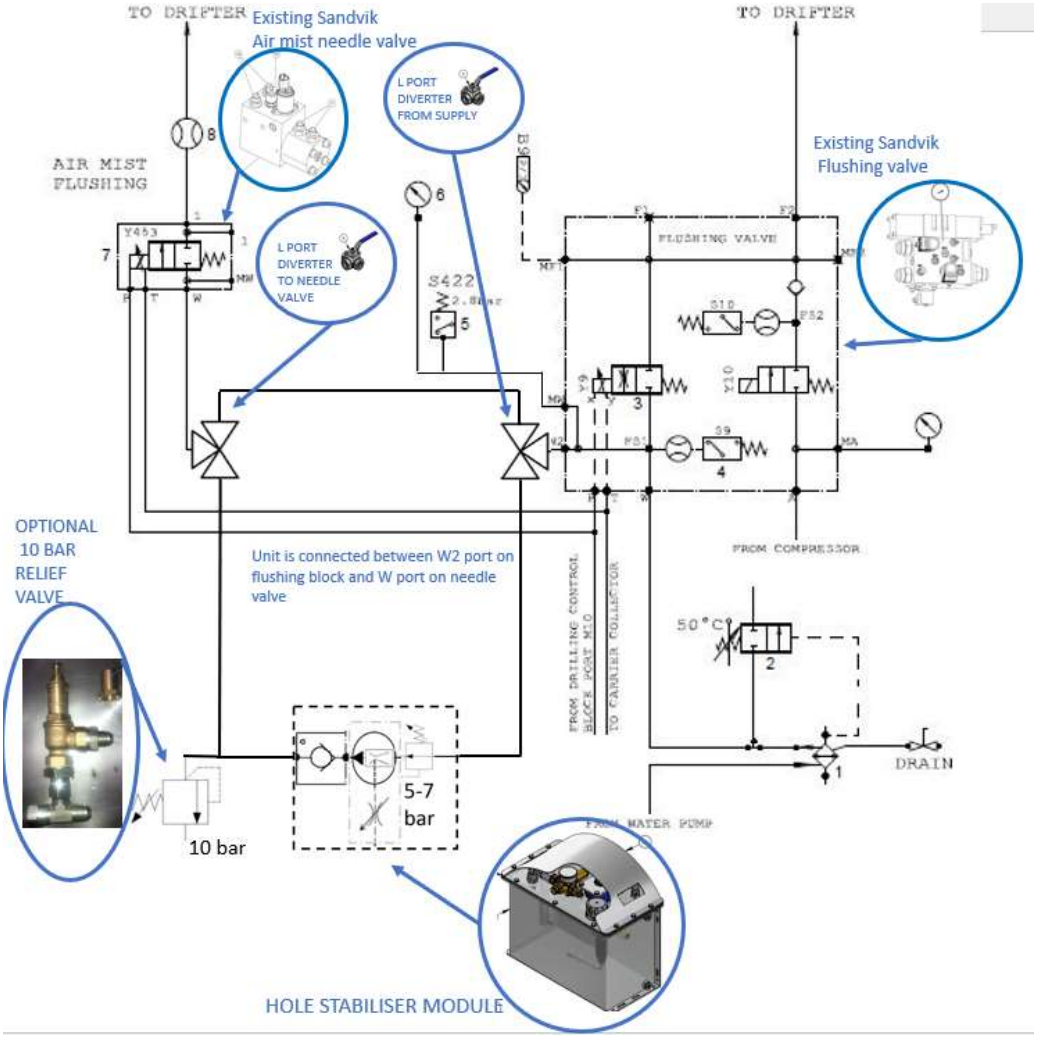
Epiroc L6, M6 and E7 long hole drills are equipped standard with air mist drilling. Using a cat or Dynaset high pressure pump to add a regulated amount of water to a full air pressure stream delivered via a separate connection at the rear of the rig to the mine air supply. To dose BHS chemical to the water a three way diverter valve is placed before Cat or Dynaset pump and when BHS dosing is required the inlet water is diverted to the MT BHS module which includes a pressure reducing valve(set to 5 bar) and then through a chemical dosing pump, the chemical dosing pump is an accurate water powered pump that adds between 0.2%-2%(recommended setting 1.5%) BHS solution to the water mix. The homogenized water/BHS solution then passes through a one-way check valve before re-entering the inlet of the Cat or Dynaset pump through a second three way diverter valve and being injected into the air stream that is used for flushing. By using 2 separate diverter valves the system is completely isolated from the drill rig when not in use.

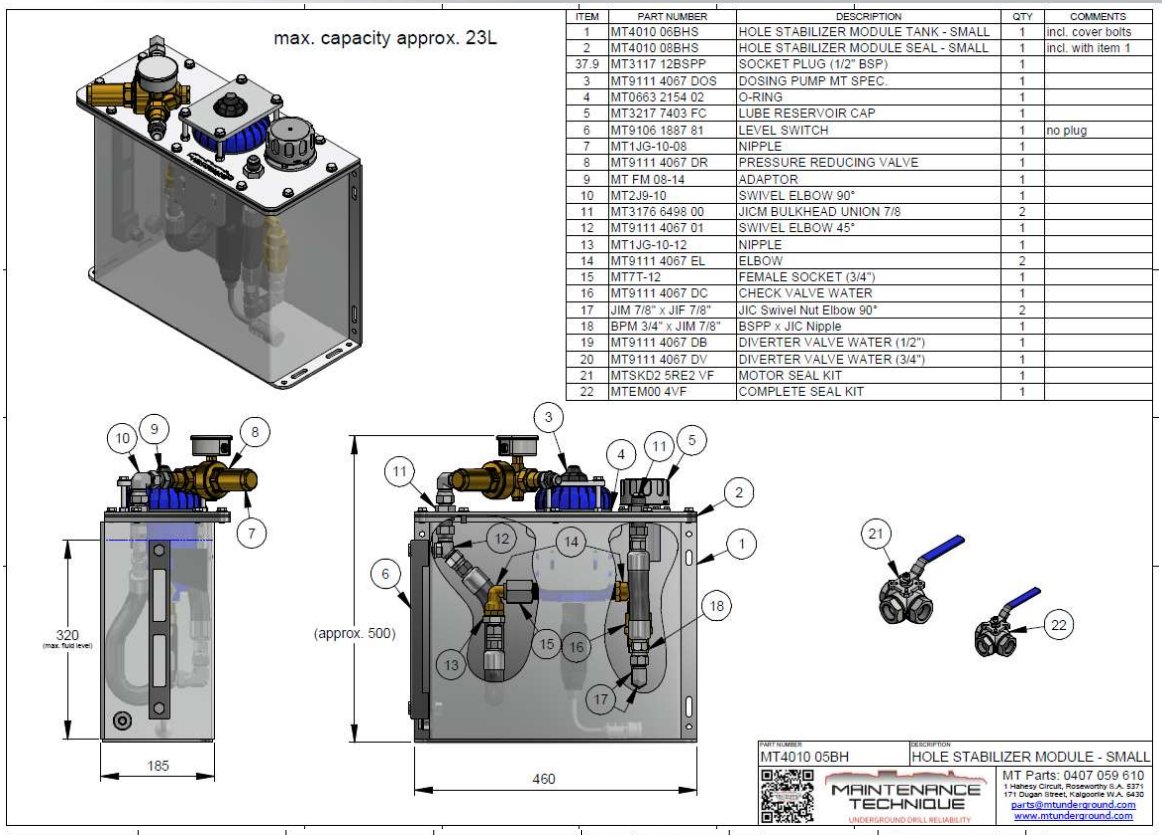


Sandvik long hole drills

The stabilizer module is connected between the Sandvik flushing valve and the air mist valve as shown below. The optional 10 bar relief can be connected to the outlet of the stabiliser module to prevent damage in the event of pressure exceeding 10 bar. Some Sandvik drills do not have the air mist needle valve as shown or it has been removed and replaced with a hand operated valve. This will not affect the application. With air mist flushing activated to maximum use a 10mm Allen key to adjust the pressure reducing up to 7.5 bar. Water should start being injected into flushing airstream, BHS will be dosed into water stream and injected into flushing.

If water does not start being injected, it may be necessary to increase pressure by adjusting the pressure reducing valve above 7 bar. DO NOT EXCEED 10 BAR. Operator can then adjust the amount of water/BHS dosing either using the GUI panel or hand valve to suit drilling conditions.

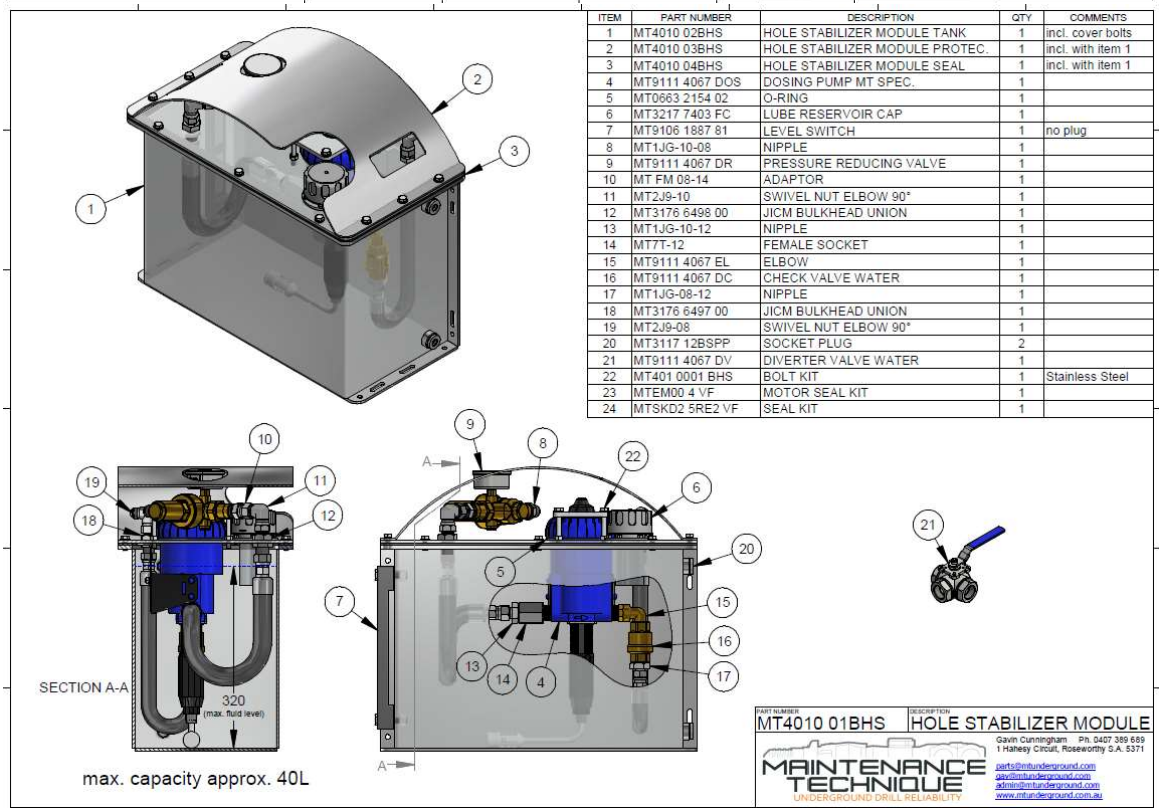




ITEM	PART NUMBER	DESCRIPTION	QTY	COMMENTS
1	MT4010 06BHS	HOLE STABILIZER MODULE TANK - SMALL	1	incl. cover bolts
2	MT4010 08BHS	HOLE STABILIZER MODULE SEAL - SMALL	1	incl. with item 1
37.9	MT3117 12BSPP	SOCKET PLUG (1/2" BSP)	1	
3	MT9111 4067 DOS	DOSING PUMP MT SPEC.	1	
4	MT0663 2154 02	O-RING	1	
5	MT3217 7403 FC	LUBE RESERVOIR CAP	1	
6	MT9106 1887 81	LEVEL SWITCH	1	no plug
7	MT1JG-10-08	NIPPLE	1	
8	MT9111 4067 DR	PRESSURE REDUCING VALVE	1	
9	MT FM 08-14	ADAPTOR	1	
10	MT2J9-10	SWIVEL ELBOW 90°	1	
11	MT3176 6498 00	JICM BULKHEAD UNION 7/8	2	
12	MT9111 4067 01	SWIVEL ELBOW 45°	1	
13	MT1JG-10-12	NIPPLE	1	
14	MT9111 4067 EL	ELBOW	2	
15	MT7T-12	FEMALE SOCKET (3/4")	1	
16	MT9111 4067 DC	CHECK VALVE WATER	1	
17	JIM 7/8" x JIF 7/8"	JIC Swivel Nut Elbow 90°	2	
18	BPM 3/4" x JIM 7/8"	BSPP x JIC Nipple	1	
19	MT9111 4067 DB	DIVERTER VALVE WATER (1/2")	1	
20	MT9111 4067 DV	DIVERTER VALVE WATER (3/4")	1	
21	MTSKD2 5RE2 VF	MOTOR SEAL KIT	1	
22	MTEM00 4VF	COMPLETE SEAL KIT	1	

PART NUMBER: MT4010 05BH
DESCRIPTION: HOLE STABILIZER MODULE - SMALL

MAINTENANCE TECHNIQUE
UNDERGROUND DRILL RELIABILITY
MT Parts: 0407 059 610
1 Hahesy Circuit, Roseworthy S.A. 5371
171 Dugan Street, Kalgoorlie W.A. 6430
parts@mtunderground.com
www.mtunderground.com



ITEM	PART NUMBER	DESCRIPTION	QTY	COMMENTS
1	MT4010 02BHS	HOLE STABILIZER MODULE TANK	1	incl. cover bolts
2	MT4010 03BHS	HOLE STABILIZER MODULE PROTEC.	1	incl. with item 1
3	MT4010 04BHS	HOLE STABILIZER MODULE SEAL	1	incl. with item 1
4	MT9111 4067 DOS	DOSING PUMP MT SPEC.	1	
5	MT0663 2154 02	O-RING	1	
6	MT3217 7403 FC	LUBE RESERVOIR CAP	1	
7	MT9106 1887 81	LEVEL SWITCH	1	no plug
8	MT1JG-10-08	NIPPLE	1	
9	MT9111 4067 DR	PRESSURE REDUCING VALVE	1	
10	MT FM 08-14	ADAPTOR	1	
11	MT2J9-10	SWIVEL NUT ELBOW 90°	1	
12	MT3176 6498 00	JICM BULKHEAD UNION	1	
13	MT1JG-10-12	NIPPLE	1	
14	MT7T-12	FEMALE SOCKET	1	
15	MT9111 4067 EL	ELBOW	1	
16	MT9111 4067 DC	CHECK VALVE WATER	1	
17	MT1JG-08-12	NIPPLE	1	
18	MT3176 6497 00	JICM BULKHEAD UNION	1	
19	MT2J9-08	SWIVEL NUT ELBOW 90°	1	
20	MT3117 12BSPP	SOCKET PLUG	2	
21	MT9111 4067 DV	DIVERTER VALVE WATER	1	
22	MT401 0001 BHS	BOLT KIT	1	Stainless Steel
23	MTEM00 4 VF	MOTOR SEAL KIT	1	
24	MTSKD2 5RE2 VF	SEAL KIT	1	

PART NUMBER: MT4010 01BHS
DESCRIPTION: HOLE STABILIZER MODULE

MAINTENANCE TECHNIQUE
UNDERGROUND DRILL RELIABILITY
Gavin Cunningham Ph. 0407 389 689
1 Hahesy Circuit, Roseworthy S.A. 5371
parts@mtunderground.com
gav@mtunderground.com
admin@mtunderground.com
www.mtunderground.com.au