SIBRE AUSTRALIA

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INSTALLATION, OPERATION AND MAINTENANCE MANUAL

V2.1 TSD (Two Step Delay) BRAKE CONTROL UNIT

1.0 Contents

2.0 Installation

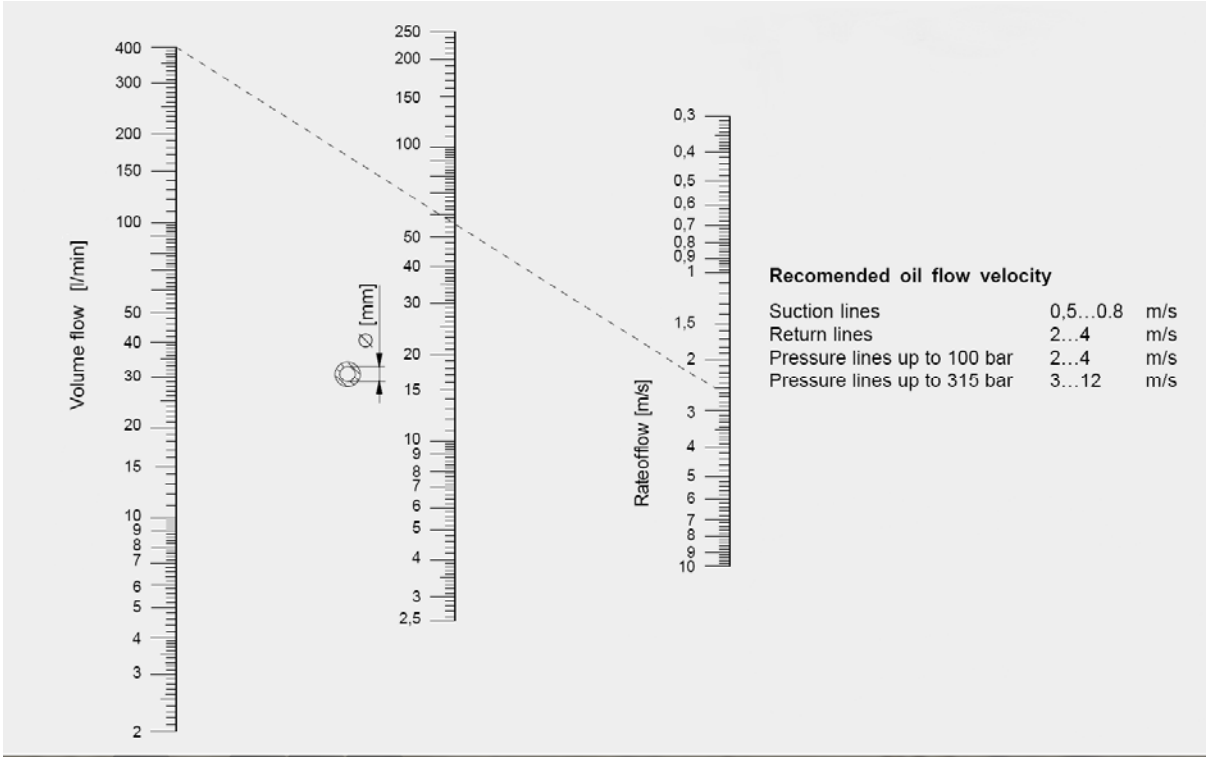
2.1 Pipework

Minor problems can be easily avoided by careful attention to the fitting of intermediate pipework. The following points will serve as a general guide.

1) Choose pipe of sufficient diameter and wall thickness to carry the flow of fluid without restriction and to avoid any safety implications.

   All pipe adopted should be suited to the working pressures of the system.

   We recommend the use of seamless precision steel tubes.



   For further guidance please refer to circuit drawing or contact **SIBRE AUSTRALIA** for advice, especially where lengthy runs of pipe are used.

2) **Eliminate** sharp bends (do not use elbows) wherever possible. Smooth, even bends prevent turbulence and increase efficiency.

3) Keep pipe runs as short as possible. Long pipe runs increase frictional losses and reduce efficiency.

4) **Do not** 'kink' hydraulic hose. A good general rule is to ensure that the radius of the bend is not less than five times the outside diameter of the hose. (Consult your hose supplier).

5) Only new piping should be used for installation or replacements. This will avoid dirt being carried into the fluid and causing damage to valves and cylinder bores. All new piping should be supplied end capped and pipe oiled. **Always** check the inside condition of pipe before bending and assembling. When the pipe has been welded, it may need to be pickled before installation to remove internal scale.

6) **Do not** allow any sealing compound to enter the pipes. This will mix with the fluid and cause contamination.

7) Tighten all pipe connections firmly. All pipe joints above 12mm O/D should be made in a vice before final assembly. (Consult your fittings supplier for assembly instructions). **Loose connections cause leakage.**

8) If a leak does occur, stop the system by turning off the pump/motor and tighten up the joint. **Do not** attempt to tighten with the system running. Avoid accidents by cleaning up all fluid spilt on the floor.

9) All piping between the power unit and actuators should be rigidly clamped to prevent shocks in the system loosening the fittings. We recommend clamping intervals of 1 meter or less. After every bend or joint we recommend 0.3m maximum before the first clamp.

Qualified 'SIBRE AUSTRALIA' Installation Engineers are available to undertake all types of on site installation/site work.

Remember, poor pipework installation can cause **catastrophic** failure within a very short period of time from system start-up, and, of course, **invalidate SIBRE AUSTRALIA'S** warranty.

IMPORTANT NOTE: The warranty on the hydraulic system will be withdrawn if the above procedures are not followed.

2.2 Flushing

During the assembly and installation of hydraulic systems with many pipe runs it is easily possible for dirt and other contamination to find their way into the pipe and other items of equipment. Therefore, it is necessary with such systems to flush out all this contamination so that it cannot have an adverse effect on the operation and life of the equipment.

Flushing involves circulating hydraulic fluid through the system at high speed. The fast flowing fluid carries the particles of dirt along with it to where they can eventually be removed in a filter.

Items of equipment that could be damaged by the flushing must either be replaced by suitable devices or bypassed using pipes or hoses.

The type of flushing fluid used must be compatible with the fluid eventually to be used in the system and with the materials used in the system, especially the seals.

The flushing fluid should be introduced into the tank of the flushing unit through a filter.

While flushing is in progress keep a close watch on the clogging indicators of the filters so that the elements can be changed or cleaned at the right time.

It is advisable to reverse the direction of the flow after about an hour of flushing. Flushing should be continued until the filter blocking indicators have been showing nothing for more than an hour. The flow should be reversed again. Take fluid samples from the system and see whether the required level of cleanliness has been achieved.

Make sure that all parts comprising the hydraulic systems are flushed. If necessary, isolate certain parts of the system and flush them individually.

When flushing is complete ensure that all residual fluid is removed from any dead legs.

Obviously, any bypass and other auxiliary devices that have been fitted solely for the purpose of flushing must be removed afterwards so that the hydraulic system is then restored to its fully functioning state.

If the system is not to be filled with fluid for some time before the final commissioning is undertaken it might be necessary to flush the system through with an anti corrosion fluid.

A particular point to note is that systems containing servo valves will have to be flushed for up to 48 hours in order to obtain the required degree of cleanliness.

3.0 Start Up Procedure

Step 1

Ensure the power unit is filled with a fluid equivalent to that shown on the schematic. Fill to the top mark on the fluid level gauge. The fluid **must be** filled through the filling point provided on the tank lid.

Important Notice:

Under no circumstances must the reservoir be filled directly from an oil drum. The fluid **must** be transferred from the drum to the reservoir via a filtration unit (10 micron rating). If there is not one available on site, please contact **SIBRE AUSTRALIA** for advice. All pipework installation must be thoroughly flushed prior to system start up. If the installation is **not** carried out by **SIBRE AUSTRALIA**, you are directly responsible for this.

Step 2

When wiring up the electric motor, the rotation should coincide with the arrow markers situated on the motor cowl/pump flange. When checking rotation, **momentarily** depress the start button - no more than is necessary to determine the rotation. If the motor is left running in the wrong direction for more than as few seconds, irreparable damage will be done to the hydraulic pump, which is directly coupled to the motor.

Step 3

Ensure you understand the hydraulic circuit before start-up. If in doubt, contact **SIBRE AUSTRALIA** for assistance.

SIBRE AUSTRALIA Commissioning Engineers are available to carry out site work. Remember, poor pipework installation can cause **catastrophic** failure within a very short period of time from system start-up, and, of course, **invalidate SIBRE AUSTRALIA'S** warranty period.

IMPORTANT NOTE: The warranty on the hydraulic system will be withdrawn if the above procedures are not followed.

4.0 Description of Hydraulic Brake System

4.1 General

The Sibre V2.1 TSD Brake Control Unit has been designed specifically for use in conveyor drive applications where full braking force needs to be applied in two stages to prevent mechanical damage to the drive or conveyor belt.

The V2.1 BCU is designed to be used in conjunction with the SIBRE range of SHI Spring applied Hydraulic calliper disc brakes and can be used to control generally up to 4 brakes depending on their distance from the BCU.

The V2.1 BCU consists of the following main components:

- 1.1 kw 3 Phase Electric Motor
- Pump
- 0.75 l Accumulator
- Manifold with control valving
- Level switch
- 6L Aluminium Tank, Filler Breather and Sight Level gauge
- Digital P/switch with two adjustable set points (S1 & S2)
- Stainless Steel enclosure approx.
- Electrical components terminated into separate junction box

4.2 Function

4.2.1 System energy

With the BCU connected to one or more SHI calliper brakes, the electrical motor (8) and the pump (9) convert electrical power into oil pressure and oil flow to release the brakes. As the brakes are spring applied, pressure is then released from the callipers to allow the brakes to apply clamping force against the disc.

Pressure is limited by:

- The pressure switch set point S1 (13) which is a normally closed contact that opens once its upper set point (S1) is reached and turns off the motor. The pressure switch is working redundantly
- The safety relief valve (16a).
- The check valve (4) prevents pressure from going back to tank, when the motor stops.
- An accumulator (11) serves as pressure backup preventing the motor from frequent restarts as well as providing additional flow during controlled braking to create a time delay.

4.2.2 Normal operation: BRAKES RELEASED

- With Solenoid Valve (14) energised (Closed), start the Electric Motor. Pressure should quickly build up to Brake release pressure S2 and release the Calliper Brake.

- As Accumulator Pre-charge is set slightly higher than brake release pressure S2, pressure will now increase more slowly as the accumulator begins to fill.
- Once S1 pressure is reached, NC S1 contact will open to signal electric motor to stop. If there is a slight delay between S1 pressure being reached and Electric Motor turning off then max system pressure will be limited by Relief Valve (16a).

- **WARNING**: As the system is not designed to run continuously, the electric motor should not run for any more than 30 sec after set point S1 has been reached, and no more than 3 mins continuously before S1 contact signals motor to turn off. If either of these situations occur, a motor run fault signal should be generated and the control system should switch off the electric motor immediately.

- During Brake release Solenoid Valve (14) must remain energised to maintain pressure in the system and keep brakes released.
- Over a period of time system pressure may gradually drop. If pressure drops below set point r1, NC contact S1 will again close and signal Electric Motor to start and build pressure back up to set point S1, where it will again turn the electric motor off. In this way the Motor will only run intermittently as required.
- NO contact S2 is typically used to indicate brake is released once set point S2 is reached and Brake Applied once set point r2 is reached (r2 is typically set to 5 Bar).

4.2.3 Normal operation: BRAKES APPLIED

- Once Solenoid Valve (14) is de-energised (Opened), system pressure is then reduced to the setting of Counter Pressure Relief (16b), which is set from the factory at approx. 50% of Brake release pressure S2.
- In this manner reduced braking force is applied against the disc during initial braking to reduce mechanical shock to the belt and drive. The setting of counter pressure relief valve (16b) can also be adjusted or tuned to suit the customer's specific drive characteristics and stopping times.
- The accumulator (12) will now begin to gradually discharge across relief valve (16b). The speed at which this discharges occurs can be adjusted via Flow Control Valve (15), effectively varying the amount of time before full clamping force is applied to the disc.
- Once the flow from the accumulator has been depleted, and system pressure reduced to set point of relief valve (16b), residual pressure will then be bleed down to zero via orifice (18).
- At this point full clamping pressure will be applied against the disc.

4.2.4 Applying the brake(s) against a static disc after a controlled stop.

During a normal stop the brakes will only be applied against a stationary disc once the conveyor drive has already been brought to a controlled stop.

- Once the drive has stopped rotating, Solenoid Valve (14) should be opened (de-energised).

- This will release the pressure as described in 4.2.3 until pressure is reduced to zero allowing full braking force to be applied against the disc.
- In this situation the brakes are performing only as a holding application.

4.2.5 Operation in the event of power failure or emergency stop

In the event of power failure or emergency stop, the brakes may be used to dynamically slow the conveyor to a controlled stop within a specified stopping time (typically between 0 – 10s).

- Once power is removed from Solenoid Valve (14) the brakes will immediately apply to the rotating disc as described above in 4.2.3 at the reduced braking force set by Counter Relief (16b).
- This will reduce mechanical loading to the Belt and Drive for the delay period set via Flow Control (15).

Full braking force will then be applied to the disc after residual pressure in the brake has fully reduced to zero Bar.

4.2.6 Hand pump

For maintenance purposes the brake may be released via the hand pump (11) mounted to the left hand side of the main manifold.

- Fix the handle to the hand pump (11) which is mounted to the frame near the bottom of the reservoir.
- Pull down and hold the manual lever on Solenoid Valve (14) while operating the hand pump lever.
- Depending on the system pressure, it may take between 80 – 100 pumps to fill the accumulator and reach full system pressure.

IMPORTANT
For the brake to stay released, valve (14) must be left energised.

4.2.7 Functional Matrix

Function	Valve/Component		
	Hand Pump (11)	DC valve (14)	Motor (8)
Normal operation (no braking)	0	1	1
Controlled braking	0	0	0
Power failure	0	0	0
Manual release	1	1	0
0 – De-energised / De-activated 1 – Energised / Activated			

4.2.8 Pressure switch

The pressure switch is working redundantly and has 4 switching points in total.

- Switching point **S1** signals the upper set point has been reached to turn off the electric motor.
- Switching point **r1** signals the lower set point has been reached to switch the electrical motor on again.
- Switching point **S2** gives the signal showing **Brake Released**
- Switching point **r2** gives the signal showing **Brake Applied**

4.2.9 Level switch

The tank mounted level switch will send a signal when the oil level in the tank is too low. This can be programmed to shut down and disable the electric motor until oil is topped up.

5.0 Commissioning

This section describes the stages of installation of the hydraulic power unit, which must be completed before commissioning (e.g. during first time installation) or during re-installation of the unit after completion of repairs / overhaul.

- Mounting the unit the equipment/foundation.
- Connect the external pressure connections.
- Checking the accumulator pressure.
- Checking/filling the tank with oil.
- Electrical connection.
- Check rotational direction of the electrical motor.
- Bleeding and flushing.
- Functional test.

5.1 Mounting

The power unit must be mounted on level surface
The unit can be mounted as either wall mounted or floor mounted using the 4 enclosed angle brackets. Each angle bracket is mounted using two bolts (enclosed) and provides a ø13mm hole for mounting.
For mounting dimensions please refer to mounting drawing (Appendix 10.1 d)

5.2 Lifting

The brake control unit weighs approx 80 kg (180 lbs).

The hydraulic power unit can be lifted by fork lift making use of the lifting eye on the top of the enclosure

If it is necessary to remove the hydraulic unit from the cabinet because of maintenance or repair the unit can be removed from the cabinet by removal of the mounting bolts in the base of the tank (4x M8 thread).

If it is necessary to use a lifting harness, it may under no circumstances be placed around valves, gauges or accumulators. The unit may be lifted by the motor, make sure not to press against the components.

CAUTION
Do not lift the HPU with the valves etc.

5.3 Hydraulic Connections

Hydraulic pressure ports out of the cabinet is standard size 3/8” BSP.
All pipes, hoses, fittings etc. mounted to the total system, shall be flushed so it can meet the demands in NAS 1638 Class 8 or ISO 4406 Class 19/17/14.

5.4 Accumulator

Accumulators are charged and set in the factory unless otherwise labelled.

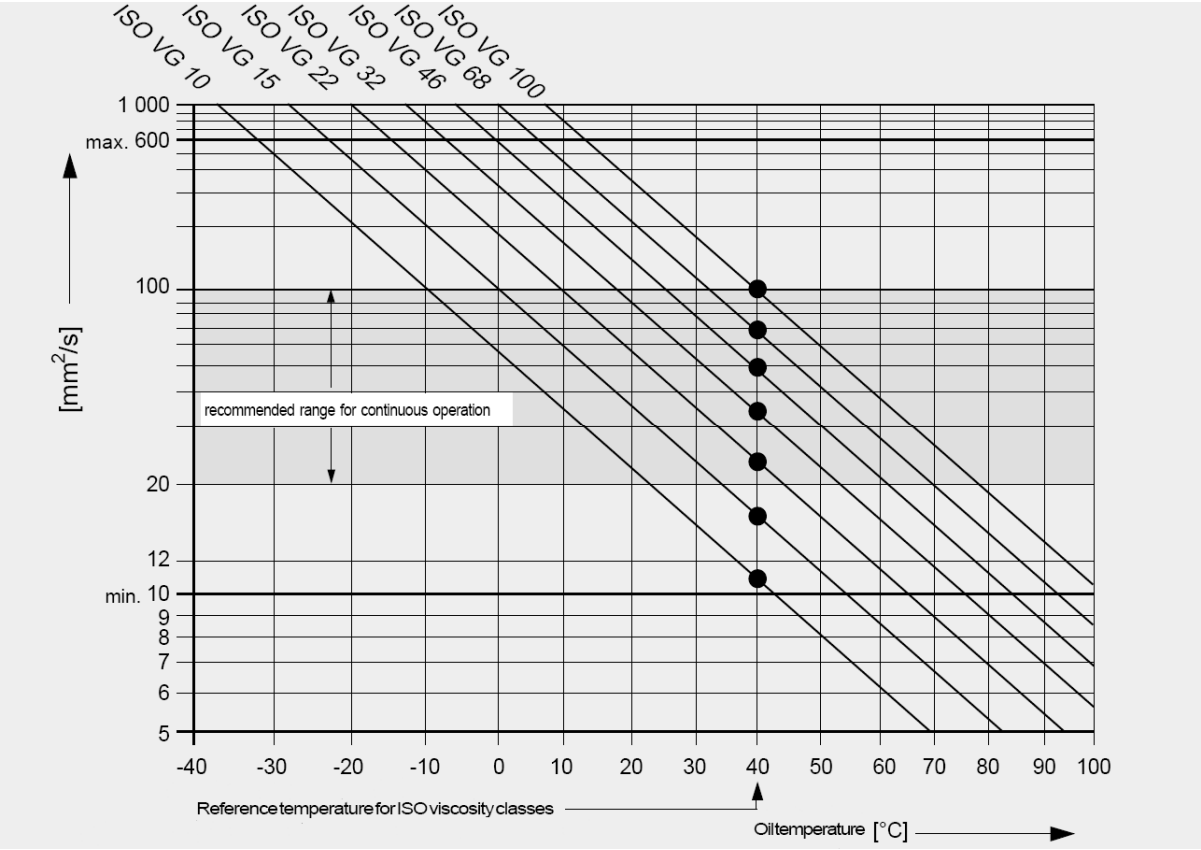
5.5 Filling the tank

The hydraulic power unit is normally sent empty, i.e. without hydraulic oil in the tank.

If running dry, i.e. without oil, the pump will be destroyed.

NOTE
Oil must be filtered using a 10-micron nominal element when filling.

CAUTION
Use oil of the right viscosity and the recommended quality.
For Australia, the general recommendation is as follows:
ISOVG 32: Cool to temperate climate (20°C to + 40°C).
ISOVG 46: Cool to temperate climate (+10°C to + 60°C).
ISOVG 68: Temperate to hot climate (+30°C to + 70°C).
The oil volume is approx. 6 litres but the level must be checked using the level glass on the tank.



- Remove filler cap from filter breather (2)
- Fill the reservoir through the filling point to the top level mark on the sight level glass located on the reservoir side wall.
- Mount the filler cap

5.6 Electrical connections

The hydraulic power unit / brake control unit has control signals as well as the electrical connection of the motor pre-wired internally to the junction box mounted on the side of the cabinet. There are two cable glands on the side of the enclosure for both control cable and AC input.
The cabinet frame should be connected to proper ground / earth connection.
See Appendix 10.1 e for electrical connection.

5.6.1 Motor rotation

Connect the electrical power. Check that the rotation of the electric motor is correct as indicated on the motor.

WARNING
The electrical connections must only be connected by a skilled electrician. Customer is responsible for ensuring al electrical connections are made in accordance with national and international regulations for the installation of electrical equipment.
Voltage supply to AS/NZS 30002000 and sealed from contaminate and moisture ingress.

The device should be supplied from an isolating source and protected by an over current device to ensure the limited voltage circuit requirements according to national and international standards.
No warranty will be considered if this is not completed accordingly.

5.6.2 First run

Start the electric motor and let the unit run 10 cycles (pressurising/de-pressurising):

- With system pressurised, bleed the brakes.
- With system de-pressurised, refill oil if necessary.

5.7 Functional Test

A functional test can be conducted by testing the below components according to the table.

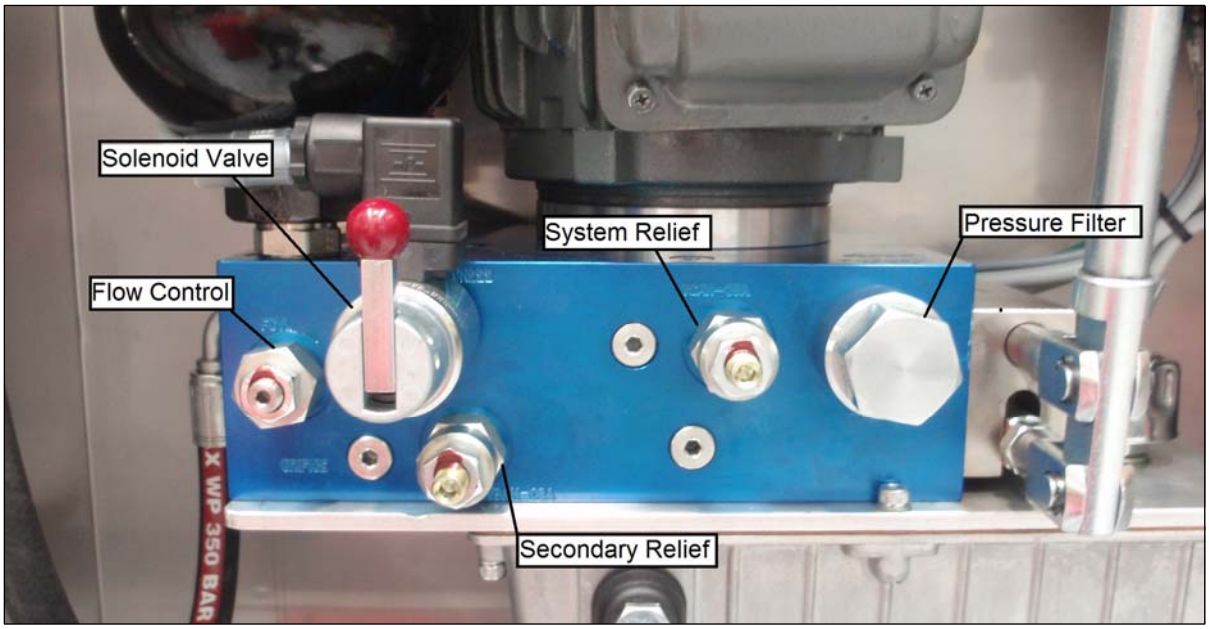
Component under test (see hydraulic diagram)	Component		Explanation
	Before action	Action	
8, 9, 13, 14	14 - energised	8 - on	Motor shall start and build pressure in the circuit until the pre-set pressure signal from PS1 (S1) is reached, the motor will then cut out. For a period of 10 minutes the motor shall not re-start providing all connections and the valves (14) are tight. CAUTION: This test will release the brakes.
12, 14, 15, 16	14 – energised 8 - off	14 - de-energised	Opening (de-energising) valve (14) shall release pressure in the brake circuit allowing it to flow over Counter relief valve (16) back to tank in a controlled manner over a time period depending on the setting of flow control (15). CAUTION: This test will apply the brakes.
11, 5	14 – Energised or manually actuated. Pressure gauge attached to test point (5)	Operate hand pump (11)	Motor disconnected/off with no pressure in the system and all valves closed. Operating the hand pump will result in the pressure in the circuit raising to either the hand pump pressure setting or the setting of the system relief valve (whichever is lower).

6.0 Set-up

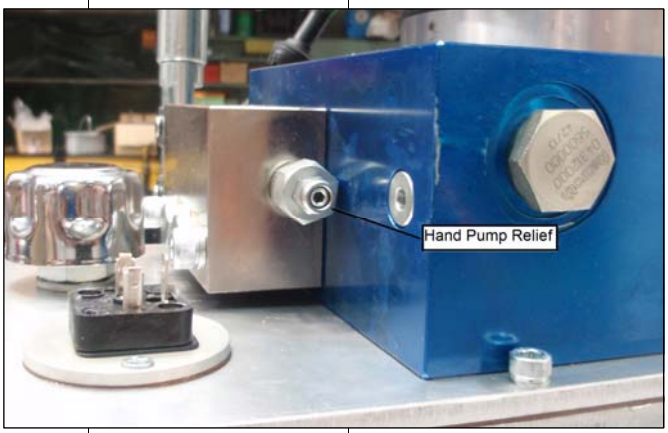
HPU will arrive pre-set to work as intended by this manual; however adjustments can be made to suit the particular working conditions.

In the event that the valve settings on the HPU need to be altered or reset, please contact Sibre Australia first, then precede to follow the procedure below.

IMPORTANT:
When setting valves, do not allow the motor to run for more than 2 minutes at a time.



Component	Before Setting	Setting Procedure
Hand Pump Relief (11)	Energise valve (14). Attach pressure gauge of sufficient rating to test point (5) (optional).	Using a spanner undo the lock nut located on the Hand Pump Relief cartridge (see image). Then using a 3mm hexagonal key, unwind the adjustment screw by around 1 turns. Operating the hand pump now and noting the pressure reading on either PS1 or PS2 (optional pressure gauge) will show the relief valve setting. It is then a case of screwing the adjustment screw **in** (increase) or **out** (decrease) and re-operating the hand pump until the desired pressure is reached. Finish by re-tightening the lock nut (it helps to hold the hex key in place to avoid any unwanted adjustment during tightening). **Please note the Hand Pump relief**



		should be set to 100-105% Max HPU operating pressure, found on schematic.
System Relief (16a)	Energise valve (14). Electric motor (8) ON. Attach pressure gauge of sufficient rating to test point (5) (optional).	Using a spanner undo the lock nut located on the System Relief cartridge (see image above). Then using a 5mm hexagonal key, either turn in or out to respectively increase or decrease the pressure setting which will be shown on either PS1 or PS2 (optional pressure gauge). *When setting a relief valve it is better to adjust from a lower setting up to the desired setting rather than unwinding from a higher pressure e.g. if you wanted to set at 100 bar you would start with the valve set lower and turn the adjustment screw in until 100 bar is reached.* Finish by re-tightening the lock nut (it helps to hold the hex key in place to avoid any unwanted adjustment during tightening). **Please note the System Relief must be set to no more than the Max HPU operating pressure, found on schematic.**
Counter Relief (16b)	De- energise valve (14). Electric motor (8) ON. Attach pressure gauge of sufficient rating to test point (5) (optional).	Using a spanner undo the lock nut located on the Counter Relief cartridge (see image above). Then using a 5mm hexagonal key, either turn in or out to respectively increase or decrease the pressure setting which will be shown on either PS1 or PS2 (optional pressure gauge). Finish by re-tightening the lock nut (it helps to hold the hex key in place to avoid any unwanted adjustment during tightening).
Flow Control (15)	Valve (14) de-energised. Electric motor (8) OFF. Attach pressure gauge of sufficient rating to test point (5) (optional). **NOTE: Flow Control is factory set to provide the longest delay when applying the brakes – approximately 1.5 turns from fully closed. The valve will**	Using a spanner undo the lock nut located on the Flow Control cartridge (see image above). Then using a 4mm hexagonal key, either turn in or out to respectively increase or decrease the flow restriction. To test the setting, switch on the electrical motor (8) then energise solenoid valve (14). Releasing or de-energising the solenoid valve (14) will start power unit de-compression (applying brakes), the pressure decay can be witnessed on PS1 or PS2 (optional pressure gauge). When pressure gauge shows zero bar the brakes are fully applied. If the time

	not allow any oil through if set any tighter than this.	taken for brakes to be fully applied is to be documented, stopwatch should be started when valve (14) is de-energised and stopped when pressure gauge reads zero bar. Finish by re-tightening the lock nut (it helps to hold the hex key in place to avoid any unwanted adjustment during tightening).

7.0 Shut Down Procedure

STEP 1	Release all suspended loads
STEP 2	Stop pump
STEP 3	Release all locked in pressures - *i.e. discharge fluid from accumulators.*
STEP 4	Isolate the machine electrically
STEP 5	Remove the machine fuses and fix notice
STEP 6	Ensure the machine is safe to work on

IF IN DOUBT ASK

8.0 Bleeding

Smooth action within a hydraulic system is ensured to a large degree by the incompressibility of the fluid. This incompressibility is severely impaired when air (or nitrogen from accumulators) enters the system. Irregular action of valves and cylinders accompanied by chattering and vibration will result.

Air in the system may also seriously affect the performance and durability of the fluid. Even though the general temperature of the fluid does not show an excessive rise, local oxidation may take place. This usually occurs as air enters the pump. At this point it is compressed from normal atmospheric pressure to the outlet pressure of the pump. This is turn will cause the air locks to expand, thus causing a rapid increase in temperature. Fluid surrounding each air bubble may be subjected to a temperature peak of up to 1093°C (2000°F) and becomes badly scorched and oxidised, even though the size of the bubbles are such that a rise in temperature of the total fluid content is not obvious. Oxidisation of this type is cumulative and eventually will affect the whole system.

8.1 The System

Trace the point at which air is entering. On new or recently dismantled systems, this precaution is usually unnecessary since air will have entered at the point where the units were assembled / removed. When air is entering a system inadvertently, it is usually through small holes is suction lines. However, there are other ways by which air may enter:

a) Low fluid level in the reservoir will allow air to be drawn into the pump suction.

b) Low fluid level in the reservoir allows returning fluid to cascade into the reservoir. Air may mix in the falling fluid and be drawn back into the system; particularly if a rapid flow is used with a fairly small tank.

c) Loose joint connections on pump suction pipe.

d) By pouring fluid into the tank too quickly when topping up. Slow pouring will prevent fluid/air mixture.

e) If an accumulator is fitted check for nitrogen leaks.

In general, a good airtight system, correct fluid level and submerged return lines will prevent the ingress of air. Bleeding need only then take place when a complete fluid change is carried out or when units are installed, replaced or partially dismantled on site as part of general maintenance.

It is not possible in general terms to give instructions regarding the bleeding of the system, as this differs according to the type of circuit involved, the accessibility of equipment and numerous other factors. Detailed instructions

regarding the bleeding of any particular circuit will be supplied by the design engineer responsible at the time of installation, complete with any other special recommendations for that equipment. In the event of any difficulty do not hesitate to contact **SIBRE AUSTRALIA**. As a general guide, bleed points are fitted to a fluid hydraulic system:

a) At the highest point in the circuit.

b) At any point where, for reasons of installation, the pipe shape tends to form an air lock.

9.0 General Information

9.1 Maintenance and Operation

1) Examine all external fluid seals periodically. Remove and replace defective seals as necessary.

2) Check the mountings of all units at regular intervals. All units must be secured especially those in high pressure systems.

3) Do not operate units at a pressure greater than those recommended. **SIBRE AUSTRALIA** hydraulic units must only be used with the recommended fluid at the pressure stated on the schematic.

4) In the event of a breakdown, attempt to trace the fault, starting from the pump and working outwards. Do not dismantle the system indiscriminately.

5) Do not use cotton waste or similar material to clean any part of a system. Once cotton waste has been introduced into a system numerous troubles will occur.

6) Handle all hydraulic equipment with care. Many parts are precision manufactured to very fine limits and rough handling will cause damage.

7) Ensure that all components being dismantled during maintenance are protected by capping all open ports that are exposed to the environment.

9.2 Fluid

Care of fluid in hydraulic systems is of the utmost importance, since the fluid lubricates, in addition to actually transmitting power. Failure to follow the points set out below will usually lead to system failure.

1) Use fluid of the correct viscosity. ISO VG 46 or an equivalent mineral oil is recommended for use in this hydraulic system, working under normal conditions. If fluid of a lower viscosity is used, leaks will occur and the

system becomes inefficient. High viscosity fluid may cause sluggish operation.

2) Do not let the fluid in the system overheat. Overheating not only breaks down the fluid and causes damage to seals, but lowers viscosity, thus reducing the efficiency. In general, temperatures up to 60°C (140°F) are acceptable for standard mineral oils equivalent to ISO VG 46.

3) Check the reservoir fluid level gauge at regular intervals. In the event of a rapid lowering of the fluid level, check all seals in the equipment and all pipe joints for leakage. Keep the fluid level as near to "full" as possible, and under no circumstances run the system with the fluid level below three quarters full. If this is done, air might be drawn into the system with disastrous results.

4) Unless otherwise recommended, a complete fluid change should be carried out every twelve months. Use the correct grade of fluid when refilling. The strainer fitted to the air filter/filler cap unit may restrict fast filling, but it is there to protect the reservoir and should not be removed or damaged to affect its function. Filling via the return line filter will not normally restrict the filling time.

5) Do not top up the reservoir with a different brand of fluid to that is already in use. The new fluid may be quite suitable on its own, but the inhibitors it contains may not be compatible with those of the existing fluid.

6) Store all new fluid in sealed containers away from extreme temperatures. Open containers will quickly collect "fluff" and dust, fluid so contaminated will rapidly choke the filters.

7) Do not use dirty fluid in the system. Filters will choke rapidly and fluid will not circulate satisfactorily.

8) Do not run the system with the air breather off the fluid reservoir.

9) Do not attempt to clean out the reservoir using cotton waste or any similar material. Lint material will inevitably cause sticking valves etc.

10) When operating in steamy or humid atmospheres, pipe the breather through partitions or walls to a clean dry place. This will help considerably to keep moisture from the fluid. Alternatively a sealed reservoir c/w air bag should be adopted.

9.3 Pipe Maintenance

Maintenance of the pipe system is extremely simple. The following points should be noted:

1) Make regular inspections of all pipework to ensure that no leaks are present.

2) Examine pipes for signs of external damage. A severe blow may cause a dent, weakening the pipe and restricting the fluid flow.

3) Examine flexible hose for signs of damage and deterioration. After prolonged use, especially in hot atmospheres, leaks may occur around the ends of the hoses.

10.0 Fault Finding Guide

10.1 Lack of Delivery

Cause	Remedy
Incorrect rotation of pump	Reverse immediately
Fluid level in reservoir too low	Top up with correct filtered fluid
Loose suction line connection	Check/tighten pipe fittings
Suction pipe or strainer blocked	Clean if possible or replace
Incorrect viscosity of fluid	Check with pump maker's specifications
Air breather blocked	Check and clear
Pump parts broken	Replace or repair if possible
Relief valve jammed open	Clean and adjust valve, replace if necessary
Pump speed too slow	Check speed with maker's specifications
Loss of accumulator pre-charge	Check pressure against design specification
Incomplete valve action	Isolate valve and check operation
Incorrect assembly/broken drive coupling	Rectify
Incorrect pump setting	Check and adjust if possible
Blocked filter	Clean if possible or replace

10.2 Lack of Pressure

Cause	Remedy
Is there a lack of delivery	Check with chart number 1
Relief valve set too low	Isolate system and check relief valve
Relief valve held open	Clean and adjust valve
Is fluid returning to tank through a valve	Check valve operation
Are valves leaking internally	Isolate valves and check operation
Are there any external leaks	Tighten fittings and check components
Normally closed valves stuck open	Clean and check system for contamination
Is pump casing loose	Tighten case to correct torque

Are any fluid lines/pipes blocked	Clear blockage
Incorrect assembly/broken drive coupling	Rectify
Pump failure due to fatigue, contamination, pressure overload etc…….	Check pump and repair if possible, if not replace the pump

10.3 Excessive System Noise

Cause	Remedy
Suction line or strainer blocked	Clean if possible or replace
Aeration in suction line	Check/tighten pipe fittings
Is pump casing loose	Tighten case to correct torque
Restriction in pump passages	Check and clear obstruction
Trapped air in fluid	Check components, tighten pipe fittings, bleed system if necessary
Breather blocked	Check and clear
Pump speed excessive	Check speed with maker's recommendations
Incorrect viscosity of fluid	Check ambient conditions and design specifications
Misalignment of drive coupling	Re-align
Filter too small	Check flow and pressure drop
Faulty sticking valve	Isolate valve and check operation, replace or repair if possible
Accumulator surges	Check accumulator pre-charge and correct functioning of loading valve
Loose return pipes under tank lid	Check/tighten pipe fittings
Pipework too small	Check with design specification
Intermittent electrical supply	Check for correct supply

10.4 Causes of Pump Failure

Cause	Remedy
Excessive pressure	Check relief valve setting
Seizure due to lack of fluid	See chart number 6.1
Dirt wedged in clearances	Check filters and fluid condition
Fracture of body due to pressure overload	Check relief valve setting
Pressure surges	Check accumulator pre-charge, valve settings, loading and circuit design
Failure of control valves	Replace or repair valve
Cavitation/Aeration	Check fluid lines to tank and suction pipe
Dirt materials in fluid	Check fluid and fluid condition
Incorrect viscosity of fluid	Check temperature and viscosity with design specification

Excessive pressure	Check relief valve setting
Misalignment of drive coupling	Re-align
Intensification/fluctuating load causing reverse flow	Check load against design specification and correct valve function

10.5 Irregular Cylinder Action

Cause	Remedy
Is there air in the system	Check/tighten pipe fittings, bleed if necessary
Cylinder misalignment	Check and adjust
Heavy load at slow feeds	Slides require lubrication
Hose burst valve sticking	Clean, adjust or replace if necessary
Bent piston rod	Replace with new rod and re-seal cylinder if necessary
Over centre load	Fit a load control valve
Incorrect valve setting	Isolate valve and check operation, adjust if necessary

10.6 Excessive Fluid Temperature

Cause	Remedy
Incorrect viscosity of fluid	Replace with fluid of correct viscosity
High ambient temperature	Check fluid temperature around system
Worn pump	Replace
Failure of the cooler	Repair or replace
Fluid level in reservoir too low	Top up with correct filtered fluid
Insufficient ventilation of power unit	Check position of power unit and move if necessary
Incorrect relief valve setting	Isolate valve and check operation, adjust if necessary

11.0 Servicing

11.1 Filters

However carefully the fluid is stored and handled, there is still the possibility that contamination will enter the hydraulic system. The fluid filter is therefore the most important part of the installation, as it is the sole protection against contamination reaching finely adjusted precision equipment. A badly choked filter will cause noisy running and possibly seizure. Therefore the following maintenance should be observed.

1) Suction strainers housed in the reservoir (if fitted) should be checked and cleaned every six months and replaced every twelve months. To achieve maximum efficiency, the following procedure should be undertaken:

    a) Completely clean down top of reservoir lid and remove all adjacent loose items.

    b) Remove the fixings from around the tank lid/inspection cover of the power unit and lift off cover.

    c) Unscrew the strainer(s) and withdraw from reservoir.

    d) Screw the new strainer(s) into position.

    e) Replace the inspection cover and secure with hexagon screws.

2) The circuit diagram should be read to ascertain if pressure and return-line filters are fitted. These filters should be checked at intervals not exceeding one month and replaced with clean elements every three months at least. Checking is done by observing the visual or electrical “clogging” indicators mounted on the filters themselves. If the environmental is known to be particularly “hostile” then more frequent checks should be made.

3) All filler breathers/breather units should be changed at intervals not exceeding six months.

4) Pressure filter should be checked every six months and replaced every twelve months.

11.2 Removal of Parts from System

Check the circuit systematically, starting from the pump. Ensure that the pump/motor is stopped, and that pressure is discharged from accumulators (if fitted), before removing **any** component from the system.

Pumps and Motors

1) Cut off fluid supply, disconnect all pipe connections and catch fluid in a clean receptacle. (Clean fluid can be used again in the system).

2) Disconnect drive, take out all mounting bolts and remove unit from circuit.

Accumulators

1) Switch off the pump, slowly open the accumulator tank drain line valve (if fitted).

2) Alternatively, when the pump is switched off, operate a cylinder or motor until there is no further movement.

3) Close the accumulator shut-off valve to isolate system to prevent unnecessary fluid loss.

4) Remove accumulator from system.

Valves etc.

1) Ensure that the pump drive is switched off and turn off fluid supply.

2) Disconnect all pipes and catch escaping fluid in a clean receptacle.

3) Plug open pipes to prevent ingress of dirt. Do not use fluffy material.

4) Take out mounting bolts and remove from circuit.

Reverse this procedure when replacing valves; Torque up fixing bolts accordingly - see Re-Installation.

11.3 Servicing Components

1) Replace all seal rings.

2) Blow out all ports and drillings with compressed air.

3) Check all threaded parts for stripped threads.

4) All traces of cleaning solvent must be removed prior to re-assembly, preferably using clean, dry, compressed air.

11.4 Re-Installation

Careful re-installation of all units removed for servicing is of utmost importance. All parts must be clean and free from foreign matter. Other points to watch are:

1) Tighten up all units to their recommended torque figures (see appropriate data sheets). This applies especially to hydraulic cylinders, pumps and valves.

2) When starting the system after maintenance or removal of parts, slacken off relief valve setting until just enough pressure remains in the circuit to work the actuators. It will be found advisable to leave the actuators uncoupled if this is at all possible. By doing this, and gradually increasing the circuit pressure, you will be saved the inconvenience of leaks at high pressure.

12.0 Final Notice

After some time in service, **all** hydraulic units should be subject to a thorough overhaul. Depending on the type of unit and local operating conditions, the interval between such overhauls can vary between 1 and 5 years.

Overhauls are best carried out by the use of complete replacement components while the original items are returned to the supplier for re-conditioning.

The use of a logbook and planned maintenance schedules is strongly recommended.

Remember:

For **minimum** maintenance, keep your hydraulic system clean.

*It must be emphasised that this brochure is **only a general** guide to the maintenance of hydraulic systems. Occasionally faults may arise as a result of a series of events that could not have been foreseen.*

*If you need to contact **SIBRE AUSTRALIA** for further assistance, please quote the following information:*

1) Serial Number of Power Unit
2) Circuit Drawing Number
3) Your Reference/Order Number
4) Approximate date of installation
5) Full list of suspected faults or malfunctions

13.0 Appendices

13.1 Schematics and General Arrangements

a) V2.1 B TSD Hydraulic Schematic – see Dwg No. S-13101-111-S1
b) V2.1 E TSD Hydraulic Schematic – see Dwg No. S-13101-110-S1
c) General Assembly – see Dwg No. S-13101-100-S1
d) Mounting Frame Fabrication – see Dwg No. S-13101-101-S1
e) Electrical Schematic – see Dwg No. S-13101-120-S1

13.2 Accumulator Pre-charge Instructions

13.3 Pressure Switch Operating Instructions

10.4 Component Datasheets