Hi-Force HYDRAULIC TOOLS	OPERATING INSTRUCTIONS FOR TPA SERIES AIR DRIVEN TORQUE PUMPS (ANALOGUE GAUGE)		TDS:- 1397
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1. SCOPE

Hi-Force TPA series compressed air driven pumps are designed to operate high pressure hydraulic double acting torque wrenches with an operating pressure of 700Bar (10,000 psi).

These instructions cover the following models:

TPA07A - 7 bar (maximum) air supply.

Refer to name plate on the pump for identification.

2. SAFETY

READ ALL OF THIS MANUAL BEFORE OPERATING THE PUMP

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN SERIOUS BODILY INJURY

- Ensure that all equipment connected to the pump is in good condition and is all rated for 700 bar operating pressure.
- Always stand the pump on a stable level surface during operation.
- Never invert the pump or lay it on its side either in use, transport or in storage.
- Inspect hoses regularly for damage and wear. Do not use hoses that are frayed, kinked, abraded or leaking.
- Never move the pump or torque wrench by pulling the hoses.
- Do not work with hoses sharply bent or kinked.
- Do not handle hoses that are pressurised. Oil escaping under pressure can penetrate the skin causing serious injury. **DANGER:** If oil is injected under the skin see a doctor immediately.
- Never operate the pump unless both of the hydraulic hoses and the TWS/TWH are connect to the pump.
- Always use eye, ear and hand protective equipment when using this pump and associated equipment.
- Disconnect the pump from the air source when carrying out maintenance or adjustments (except pressure relief valve adjustments).

3. SPECIFICATIONS

The pump is a three speed pump with the following pressure and flow ranges

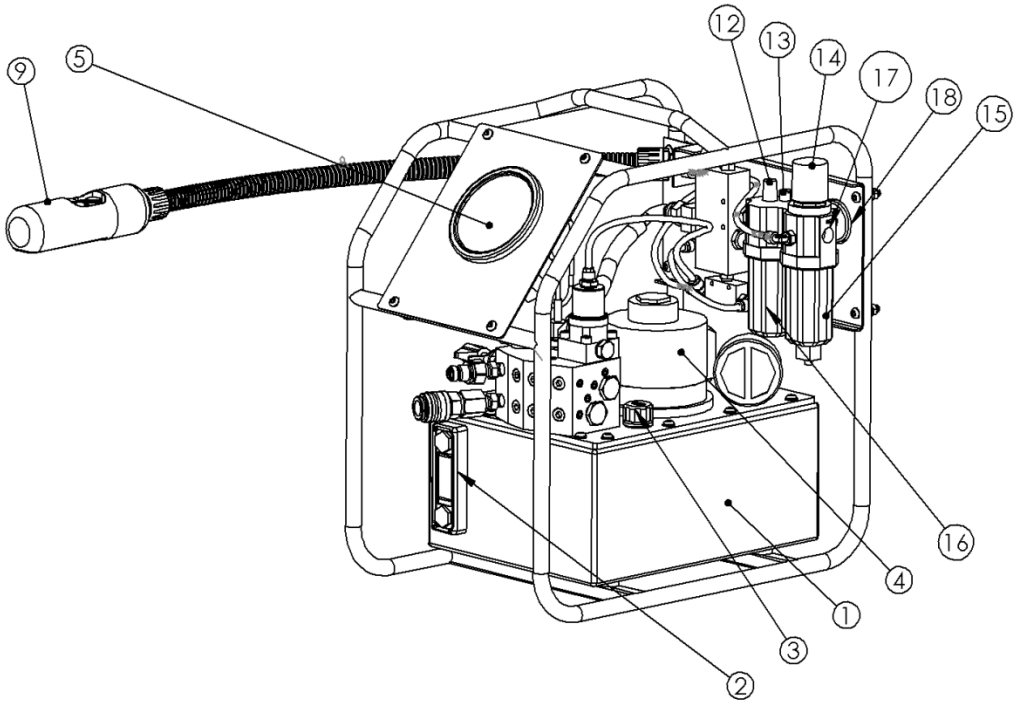
Pressure range (bar)	Flow (l/min)
0-65	7.0
65-325	1.6
325-700	0.8

Weight	30 kg (including oil)
Useable oil capacity	7 litres
Max sound pressure level	90 dB(A)
Maximum oil temperature	80 º C

4. IDENTIFICATION OF COMPONENTS

Refer to diagrams on page 3.

1. Oil reservoir
2. Oil temperature/ level gauge
3. Oil filler/ breather cap
4. Motor
5. Oil pressure gauge
6. Adjustable pressure relief valve with locking wing nut.
7. Tool advance coupler (700Bar maximum)
8. Tool retract coupler (90Bar maximum)
9. Control pendant.
10. On/advance button.
11. Stop button
12. Air lubricant control
13. Air lubricant filler plug.
14. Air pressure regulator
15. Water trap
16. Air lubricant reservoir.
17. Air inlet.
18. Air pressure gauge.
19. Additional tool ports fitted with blanking plugs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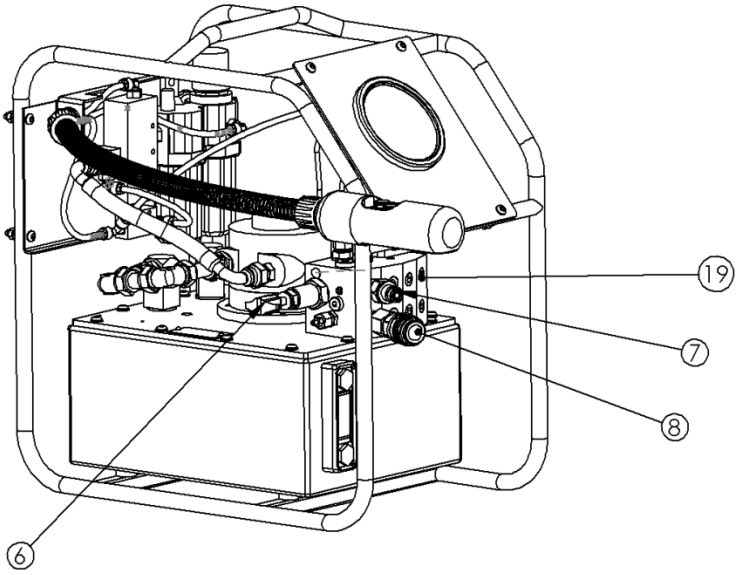
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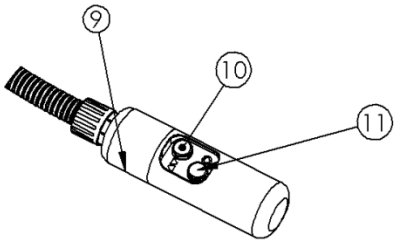
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5. PREPARATION OF THE PUMP

Immediately after unpacking, examine the pump for signs of transit damage and if found contact the shipping company.

Depending on the shipping method used, the pump may or may not be supplied already filled with oil. Check the oil level using the Temperature/level gauge (2). During transit the Oil filler/breather cap (3) will have been replaced with a black transit plug. This plug must be removed and the orange filler breather (packed separately) fitted. If the pump needs filling with oil proceed as below.

FILLING PUMP WITH OIL

Stand the pump on a level surface and fill the tank with Hi-force HFO46 oil via the filler breather cap (3) until the oil level is at, or up to approximately 10mm above the upper marker as shown on the level gauge.

The pump is self-priming, so is now ready for use.

FILL AIR SUPPLY LUBRICANT RESERVOIR.

Remove air lubricant filler plug (13) and fill air lubricant reservoir (16) with ISO VG 10 air line oil.

CONNECT AIR SUPPLY

Check that the air supply is via a minimum hose size of ½" (13mm) bore, that the available pressure is at least 5.5 bar (80psi) and preferably 7 bar (100psi) and that the compressor can supply a minimum flow of 50 cfm (25 l/sec). The pump will run satisfactorily below these figures but output flow rate will be affected.

Install a suitable connector for the hose system in use into the air inlet (17). The thread on the inlet is 3/8" BSP.

6. CONNECTION OF TORQUE WRENCH TO PUMP

Connect the torque wrench to the pump using Hi-Force type HTWH hoses. All Hi-Force torque equipment is fitted with flat face quick release couplers. Ensure both halves of the couplers are clean before connecting. To connect, simply push the male and female halves together. To disconnect, turn the knurled collar in the direction of the arrow and then slide the collar back in the direction of the second arrow. Do not attempt to connect or disconnect while under pressure.

Connect the female coupler on the red hose to the male advance coupler (7). Connect the male end of the black hose to the female tool retract coupler (8). Connect the other ends of the hoses to the torque wrench. N.B. If using torque wrenches other than Hi-Force or wrenches and hoses that have been modified, check that the wrench is connected correctly so that the male high pressure pump coupler (7) is connected to the advance port on the tool. Failure to do this may result in leakage, tool damage or personal injury.

Caution: Refer also to torque wrench operating instructions for detailed information on the correct operation of these tools.

7. OPERATION

CONTROL PENDANT BUTTON FUNCTIONS

The control pendant (9) has two buttons which perform all functions of the torque pump.

The advance button (10) is a dual function button. Pressing and releasing the button once will start the pump and set the pump to the torque wrench retract mode. Pressing the button a second time makes the torque wrench advance. The pump will continue in this mode until the button is released. The torque wrench will then automatically retract

The stop button (11) stops the pump motor..

TURN ON AIR SUPPLY.

CAUTION: When the air supply is first turned on after the pump has been in transit or storage, it is possible that the pump may start unexpectedly. If this happens press the stop button (11) on the control pendant, to stop the motor until ready to proceed.

Adjust the air pressure using the air pressure regulator knob (14) as high as the air supply will allow, up to a maximum of 7 bar. Check pressure on air pressure gauge (18) Note; the knob (14) must be pulled upwards to unlock it before it can be turned. Once adjusted it should be pushed down to lock.

AIR REMOVAL FROM HOSES.

Hi-Force hoses are supplied pre-filled with oil, but never assume that there are no air pockets in a hose. Air will make the operation of a torque wrench erratic. Due to the superior quick connect couplings on Hi-Force torque wrenches, very little air is admitted to the system when connecting and disconnecting hoses but for best performance always carry out the following operation, when interchanging hoses or torque wrenches.

Turn on air supply supply.

Press and release the advance button (10) on the pendant (9) and the pump will start.

Warning: The torque wrench connected to the pump will usually retract at this stage. Keep fingers clear. If the tool advances then it is incorrectly connected. This must be investigated and corrected before proceeding.

Check the oil pressure gauge reading (5). This should be in the range 80-90 bar. If it is not, slacken the locking wing nut on the pressure relief valve (6) and turn the knob clockwise until the gauge registers 80-90 bar. N.B it will not be possible to increase the pressure significantly above this value. This is the torque wrench maximum retract pressure and is limited be a separate pressure relief valve. The torque wrench should now be fully retracted.

Press and hold the advance button on the control pendant. The torque wrench should advance until it reaches the end of its stroke and then the pressure will start to build up. **Caution**, if the

tool does not advance and pressure is building up on the pressure gauge (5), the hoses may not be fully connected or the tool may be faulty.

Release the advance button and the tool will retract, when the tool is fully retracted pressure will register 80-90 bar once more.

Repeat this advance and retract cycle a few times to purge air from the hoses and tool.

Press stop button (11) to stop the pump.

NB if long hoses are employed (greater than 5 m) then this method will not be totally effective at removing air. Refer to section on pre-filling long hoses.

SETTING THE TORQUE WRENCH PRESSURE

Refer to torque wrench operating instructions for the pressure setting to achieve the desired torque value. This pressure will vary depending on which torque wrench is being used.

Caution: Carry out this pressure adjustment before fitting the wrench onto a bolt or nut.

Press and release advance button (10) to start pump.

Press and hold the advance button again and allow the torque wrench to fully advance. Keeping the button held down adjust the pressure relief valve (6) by turning the knob clockwise to increase pressure and anticlockwise to reduce pressure. Verify the pressure setting several times by releasing the start/advance button and re-pressing. The pressure setting can be locked at the desired value by tightening the wing nut under the adjusting knob clockwise. Do not use tools for this.

To stop the pump, press the stop button (11) on the pendant.

The pump is now ready for use.

METHOD OF USE.
Refer also to torque wrench operating instructions and bolt torque data.

WARNING: It is strongly recommended that operation of the pump and torque wrench is carried out by a single person. This will reduce the possibility of finger trapping accidents due to the wrench being operated while it is still being positioned on the nut or bolt. Where this is not possible due to the relative positions of the pump and the wrench then a clear system of communication needs to be established between users.

8. ADDITIONAL OPERATION HINTS.

OIL TEMPERATURE CONTROL
The pump is fitted with a heat exchanger in the oil reservoir. Exhaust air from the air motor (4) is fed via a cooling loop in the oil reservoir.

AIR LUBRICANT

Adjust the air lubricant control (12) such that one drop of oil is being added to the air approximately every minute. The lubricant drops can be seen through the lubricant control knob. Allowing more oil into the motor than this can cause contamination of the exhaust flow.

DISCONNECTION OF HOSES.

Always stop the pump by pressing the stop button (11) before connection or disconnection of hoses. Attempting to disconnect hoses while the pump is running is difficult and can cause leakage or injury.

CONNECTION OF ADDITIONAL TORQUE WRENCHES

The pump has the facility to drive up to 4 torque wrenches simultaneously. These will all operate at the same pressure. This feature can be useful for even tightening of large joints. However it must be borne in mind that multiple torque wrenches will operate more slowly than a single wrench, so it is not necessarily a time saving method. To use this feature, switch off the pump and disconnect from the air supply. Remove blanking plugs (19) and fit the desired number of extra pairs of couplers. It is important to fit the male coupler to the top port and the female coupler to the bottom port to ensure correct torque wrench connection. Thread size in the ports is ¼" NPT. Suitable thread sealant or PTFE tape must be used on the thread.
Hi-Force can supply torque coupler sets as follows:

TP-CS1 : torque coupler set to convert TPE pump from one outlet to two outlets
TP-CS2 : torque coupler set to convert TPE pump from one outlet to three outlets
TP-CS3 : torque coupler set to convert TPE pump from one outlet to four outlets

9. MAINTENANCE

The oil level in the reservoir should not be allowed to fall below the lower marker on the level indicator (2) during use. (check oil level with torque wrench in advance position.) Keep the reservoir topped up with Hi-Force HFO46 oil. If the oil level does fall below the minimum level then air will be drawn into the pump causing erratic operation and possible damage.

Oil should be replaced after approximately 500 working hours, or more frequently in dusty conditions. To replace the oil, disconnect from air spply, remove the filler breather cap (3) and tip used oil out of tank. Dispose of oil in a responsible manner. Refill with Hi-Force HFO46 oil.

Air lubricating oil should be topped up as required via the air lubricant filler plug (13). Use ISO viscosity grade 10 oil for this purpose. Do not use hydraulic oil.

Pressure gauge should be calibrated at least every 12 months.

10. TROUBLE SHOOTING

These pumps should be repaired only by authorised Hi-Force repair centres. The following table gives possible causes and remedies for common problems.

PROBLEM	POSSIBLE CAUSE

Tool advances with no pendant buttons pressed.	Tool incorrectly connected. Swap hose connections at tool.
Tool will only reach 80-90 Bar in advance mode, but higher in retract mode.	Tool incorrectly connected. Swap hose connections at tool.
Motor stalls before 700Bar is reached.	Low air pressure..
Motor will not start	Low air pressure or restricted air flow.
Pump will not build up or maintain pressure.	Leakage from pump or valve components – have the pump inspected by a Hi-Force repair centre
Slow torque wrench operation	Leaking seals in torque wrench. Worn piston block elements, leaking relief valve, leaking unloading valve, worn directional valve – have the pump inspected by a Hi-Force repair centre.

11. FILLING OF LONG HOSES BEFORE USE.

When long hoses are being used, it is difficult to remove all air in the hose simply by cycling the torque wrench back and forth as described in section 4. A quicker and more effective method is as follows. Connect the female end of one hose to the male coupler on the pump and connect the other end of the same hose to the remaining coupler of the pump. Switch the pump on and allow to run for a few seconds. Switch off and repeat the process with the other hose. After doing this remember to check the oil level in the reservoir.

12. PRESSURE CONVERSION CHART

BAR	PSI	kgf/cm²		BAR	PSI	kgf/cm²
10	145	10.2		360	5221	367.2
20	290	20.4		370	5366	377.4
30	435	30.6		380	5512	387.6
40	580	40.8		390	5657	397.8
50	725	51		400	5802	408
60	870	61.2		410	5947	418.2
70	1015	71.4		420	6092	428.4
80	1160	81.6		430	6237	438.6
90	1305	91.8		440	6382	448.8
100	1450	102		450	6527	459
110	1595	112.2		460	6672	469.2
120	1740	122.4		470	6817	479.4
130	1886	132.6		480	6962	489.6
140	2031	142.8		490	7107	499.8
150	2176	153		500	7252	510
160	2321	163.2		510	7397	520.2
170	2466	173.4		520	7542	530.4
180	2611	183.6		530	7687	540.6
190	2756	193.8		540	7832	550.8
200	2901	204		550	7977	561
210	3046	214.2		560	8122	571.2
220	3191	224.4		570	8267	581.4
230	3336	234.6		580	8412	591.6
240	3481	244.8		590	8557	601.8
250	3626	255		600	8702	612
260	3771	265.2		610	8847	622.2
270	3916	275.4		620	8992	632.4
280	4061	285.6		630	9138	642.6
290	4206	295.8		640	9283	652.8
300	4351	306		650	9428	663
310	4496	316.2		660	9573	673.2
320	4641	326.4		670	9718	683.4
330	4786	336.6		680	9863	693.6
340	4931	346.8		690	10008	703.8
350	5076	357		700	10153	714

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