



World Series

WT – Multi-Pressure Pump

- OPERATING INSTRUCTIONS -

AMENDMENT RECORD for WT Multi-pressure Pump Operating Manual					
Number	Date	Page	Amendment	Instruction	Pub/. Issue
1	August 2005	2	Inclusion of Amendment Record on page 2		Issue 4, August 2005
2	August 2005	7	Inclusion of minimum 1200rpm idle speed to protect piston primers		Issue 4, August 2005
3	September 2005	7	Limit priming speed to maximum of 2500rpm		Issue 5, August 2005
4	January 2007	11	Delete – “The relief valve starts to progressively open at about 45 bar and ensures that high pressure cannot exceed 55 bar.”		Issue 6 January 2007
5	August 2009	6	Safety – thermal relief valve caution. Overheat Protection – thermal relief valve caution		Issue 7 August 2009
6	August 2011	6	Gauges – do not use solvents to clean.		Issue 8 August 2011

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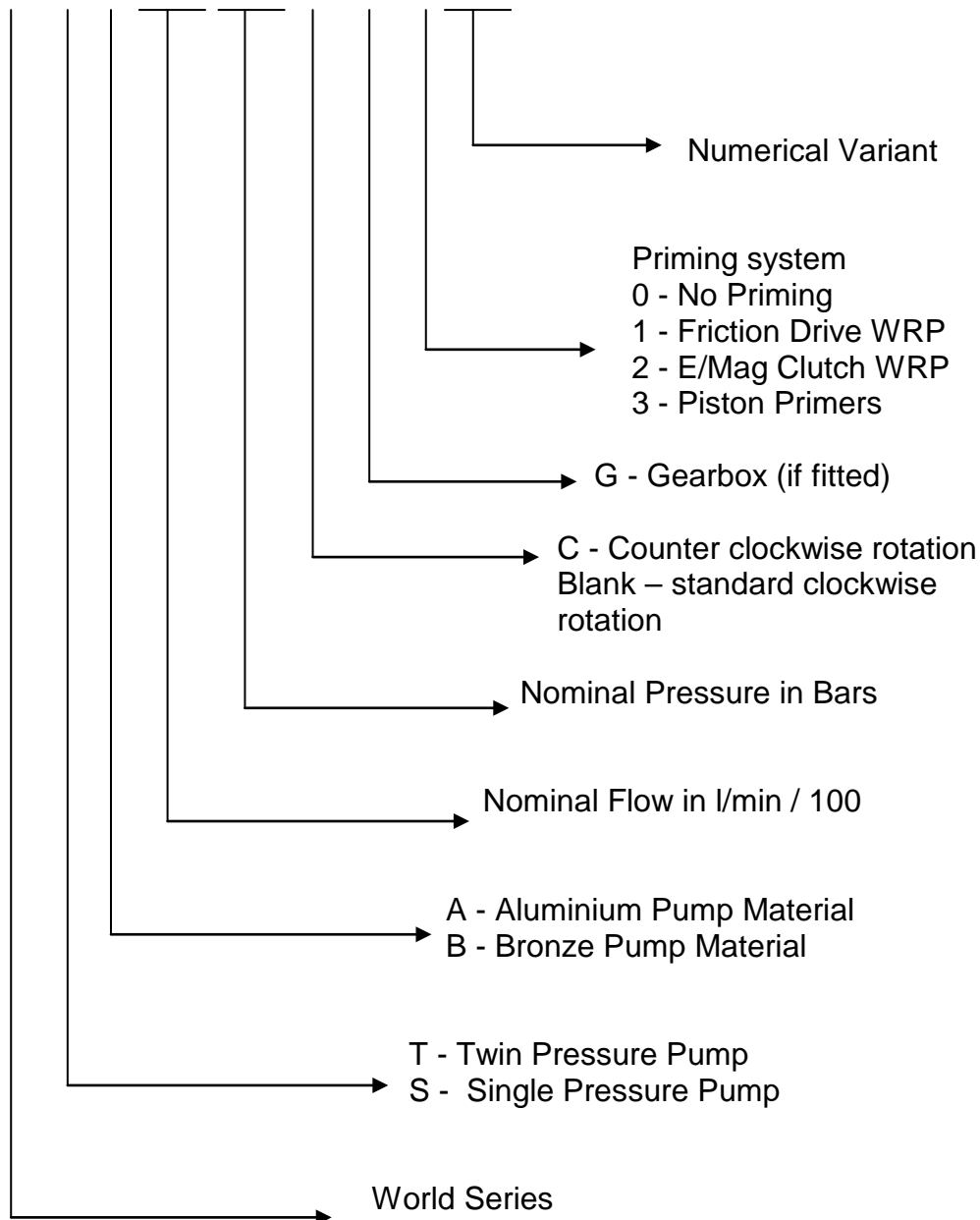
1.1 Conventions

- | | | |
|------------|---|---|
| Rotation | - | When viewed from drive flange end of pump, and refers to the direction of rotation of the drive flange. |
| Handedness | - | When viewed from the suction end of pump. |
| Front | - | Suction end of pump. |
| Rear | - | Drive flange end of pump. |

N.B. When a Godiva close-coupled gearbox is fitted the pump rotates in the opposite direction to the drive flange.

1.2 Pump Specification Number System

WTA3010CG/1xx



In addition to the above there will be additional designation letters to signify reverse rotation or gearbox option etc.

1.3 Safety

Training

It is essential that Godiva pumps are operated ONLY by trained personnel.

Maintenance

It is the responsibility of the user to ensure that the equipment is maintained in a safe operational condition, as per regulation 5 in the Provision and Use of Work Equipment Regulations 1998.

Pump

- All rotating components must be adequately guarded against accidental contact.
- Under no circumstances must any item or hand be inserted into the suction tube whilst the unit is running.
- Discharge hoses must not be disconnected whilst they are pressurised.
- No component must be unfastened whilst the unit is running.
- When installing or removing the pump from the chassis, suitable lifting equipment must be used.
- Thermal Relief Valve (optional device) – when the pump is running with closed discharge valves the water temperature inside the pump will increase until relieved by the thermal relief valve. Two versions of the valve can be fitted, 42°C and 74°C, each will open and discharge hot water at the stated temperature. If the hot water is discharged to the ground below the vehicle, fireman operators and maintenance staff must be aware of the potential hazard from the hot water and take precautions.

Noise

When the unit is running, noise will be generated and suitable ear protection should be worn.

Gauges (if fitted)

Do not clean the glass surfaces of the gauges with abrasive or solvent cleaners. These will cloud the glass surface. Use a mild detergent and water.

1.4 Speed and Output Limits

The pump speed should be limited so that the maximum low pressure attainable is limited to 17 bar.

The pressure generated in the high pressure side of the pump is internally limited not to exceed 55 bar.

The Priming speed should be limited to a maximum of 2500RPM pump speed. If piston primers are fitted the pump can be primed at idle speed – however, this will take longer.

IMPORTANT

When piston primers are fitted the minimum idle speed of the pump should be at least 1200RPM. This speed will allow the pump, when primed with valves closed, to generate sufficient pressure to disengage the primers. Idle speeds lower than this will cause the primers to work continuously resulting in excessive load and wear on the piston primer components. Failures due to insufficient idle speed may not be covered by warranty.

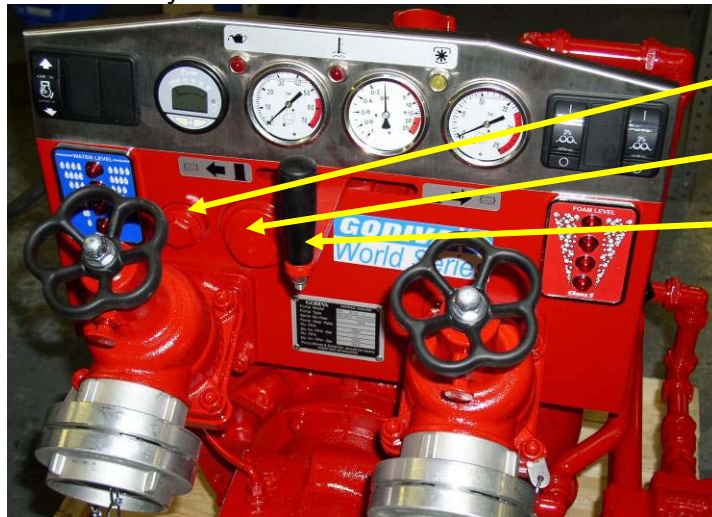
2. 0 Detailed Features

2.1 Filters

The large high pressure filter limits particle size that can reach the high pressure impeller. Although this filter is partially self flushing under some circumstances it should be regularly removed, flushed and replaced.

Flow through the high pressure filter passes from the outside to the inside, thereby encouraging debris to be dislodged from the outer surface and return to the low pressure volute.

The small filter provides filtered water to the primer lift-off feed and for an optional flushing system option when AFFF is fitted. This should also be occasionally removed and flushed.



Primer lift-off feed filter

High pressure stage filter

High pressure selector valve lever

Note: instrument panel is an option on some models

2.2 Primers

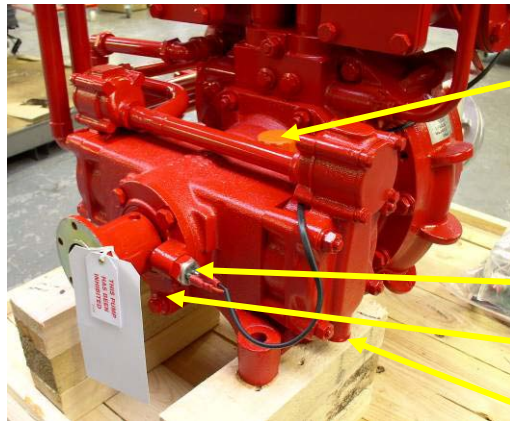
The piston primers require regular maintenance. However, if the primer discharge does not continually fall (e.g. discharging into the vehicle tank) a means must be provided to drain the discharge hoses to prevent freezing.

It should be remembered that each time a water ring primer operates a small amount of pump water is carried over into the header tank and will gradually dilute the anti-freeze concentration.

Therefore anti-freeze concentration should be regularly checked and topped up when necessary.

2.3 Oil Level

The oil level is checked by means of a combined oil level dip stick and filler. It is essential that the oil level be checked before the unit is run.



Bearing housing oil level dipstick and filling aperture.

The oil level should be checked with the dipstick screwed down in its fixed position

Tachometer (optional)

Oil drain plug

Piston primer discharge

The oil bath provided for the pump drive shaft bearings has a capacity of 0.75 litres (1.3 pints) and should be topped up when necessary with 10w/40-15w/40 multigrade engine oil. It is recommended that the oil bath is drained and refilled with fresh oil about every twelve months.

2.4 Pressure Relief Valve

Each pump is fitted with an internal pressure relief valve which discharges high pressure water into the low pressure side of the pump.

The pressure relief valve is designed to progressively open as pressure increases so eliminating any sudden surge.

The maximum normal operating pressure is designed to be 40bar but the pressure relief valve ensures that, even under abnormal operating conditions, the pressure cannot rise above 55bar.

Water passing through the pressure relief valve is directed into the filter chamber helping to dislodge accumulated debris on the external surface of the filter.

2.5 High Pressure Selector Valve

The position of this valve allows the handle to project through an instrument panel sandwiched between manifold and valves. With the handle turned to the right, low pressure is available in the hose reels. With the handle turned to the left, high pressure is available in the hose reels.

An option is available to pneumatically operate the high pressure selector valve.

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2.6 Draining the Pump

- a) High pressure selector valve should be set for the LP position (to right).
- b) Open the volute drain valve (on bottom of volute) until all flow stops. The high pressure chambers will drain automatically into the volute.
- c) Open the primer drain system, if fitted, until all flow stops. In order to completely drain the piston priming system the pump should be idled for a few seconds after use with no water in the volute and the drain valve open. This 'dry prime' will then evacuate all residual water from the priming system.

It is not recommended that the pump be retained full of water since this could result in freezing in cold climates.

Remember to close all drains before trying to re-prime the pump.

3. Pump Operation Principle

The Godiva WT two stage pump-dual pressure pump can be used for:

- a) High volume at low pressure
- b) Low volume at high pressure
- c) High and low pressure simultaneously

Whilst the pump is running low pressure flow is always available from all outlets including the hose reels. High pressure is only available from the hose reels when the high pressure selector valve is closed.

The suction connection must always be connected to a water source, whilst the pump is operating.

Low Pressure Mode

To supply high volume from the delivery valves, and low volume at low pressure from the hose reels simultaneously, the high pressure selector valve must be in the L.P. (open) position. The pressure developed by the centrifugal impeller will be related to the speed of the pump shaft, and the quantity of water being discharged. Water will be passed through the inter stage filter to the high pressure impeller, and flow from this impeller will be diverted back into the inter stage filter chamber. This then equalises inlet to outlet pressures from this impeller. (see diagram 1)

This re-circulated water is then directed at the high pressure filter helping to dislodge accumulated debris.

High Pressure Mode

To supply high volume at low pressure from the delivery valves, and simultaneously supplying low volume at high pressure from the hose reels, the high pressure selector valve must be in the H.P. (closed) position. The pressure that is developed in the high pressure stage (approximately four times the low pressure) is now prevented from equalisation by the closed high pressure selector valve (see diagram 2). Closing the valve creates a resistance to flow resulting in high pressure being generated.

Over Pressure Protection

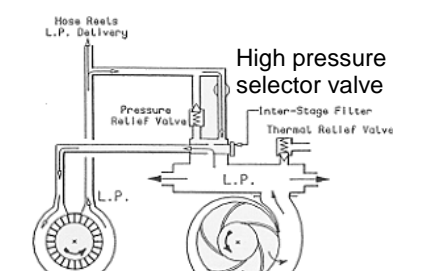
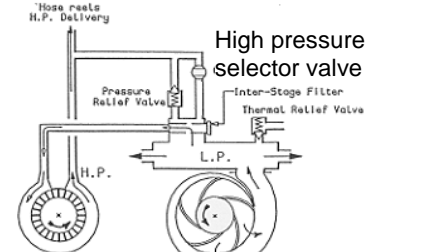
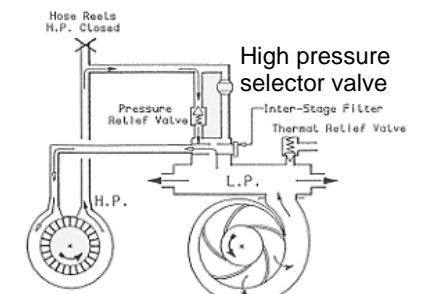
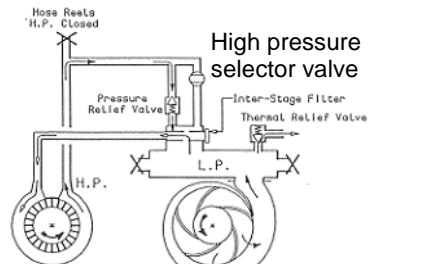
If the high pressure stage produces excess pressure, the pressure relief valve starts to open and bypasses water back to the inter stage filter chamber. (see diagram 3).

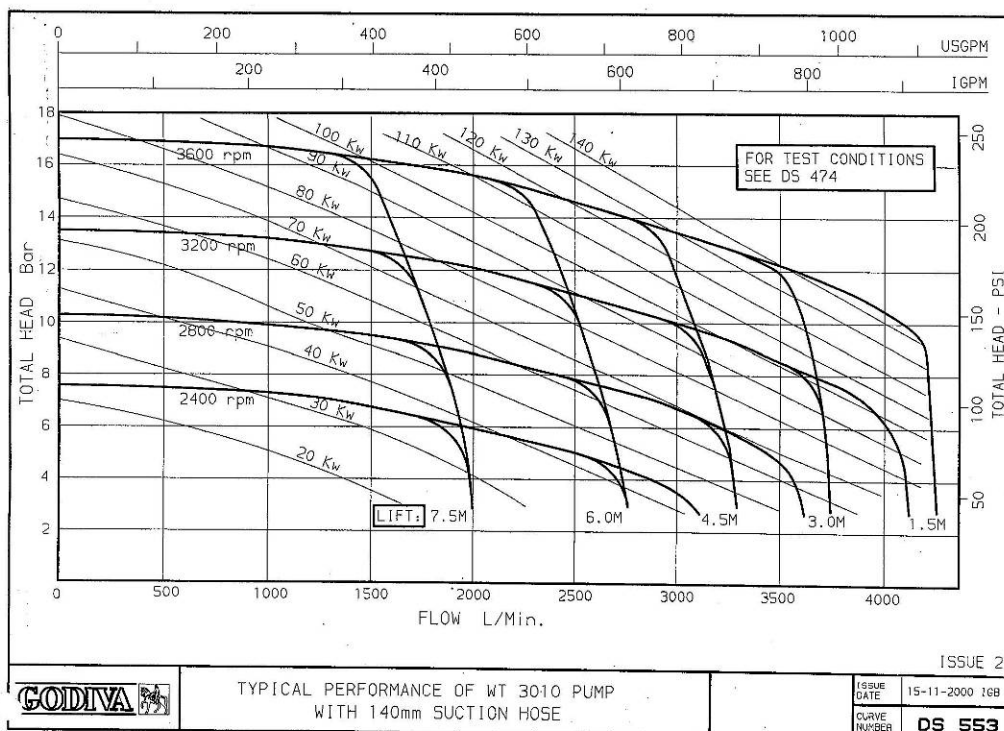
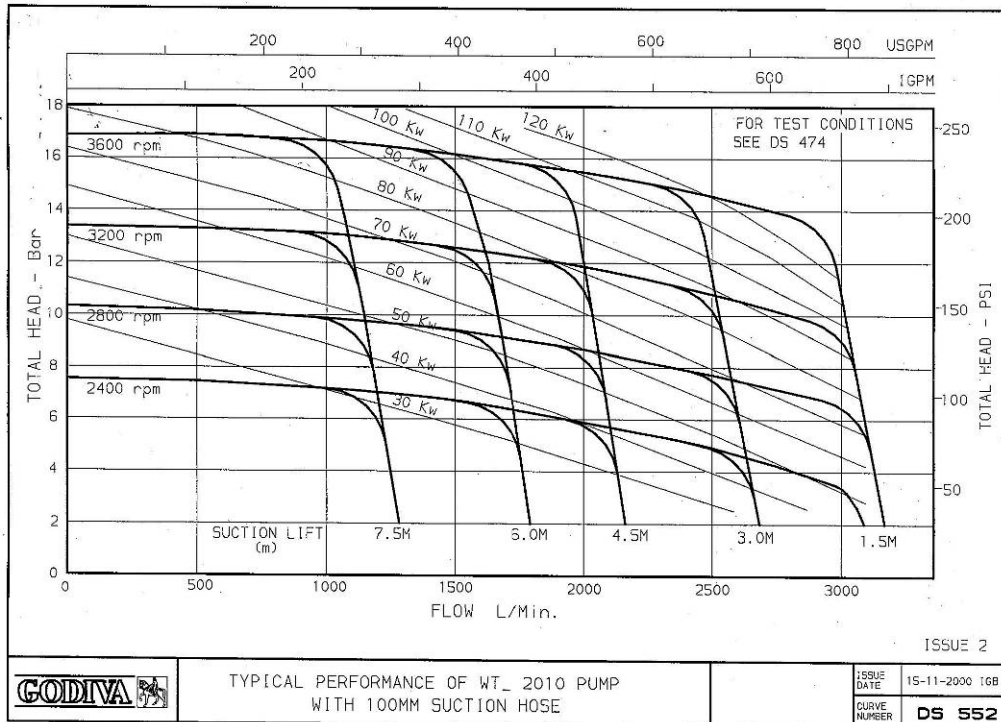
Overheat Protection

If the pump is left running at high speed, with reduced or no discharge, overheating may occur. As the pump temperature increases to 45-50°C the thermal relief valve opens to divert pump water to one of three locations:

- a) to ground, which is the easiest and lowest cost option.
CAUTION: fireman operators and maintenance staff must be aware of the hot water discharge at this location.
- b) into the vehicle tank (but not if a foam system is fitted)
- c) into a holding tank for draining later.

This allows fresh water circulation to cool the pump. (see diagram 4)

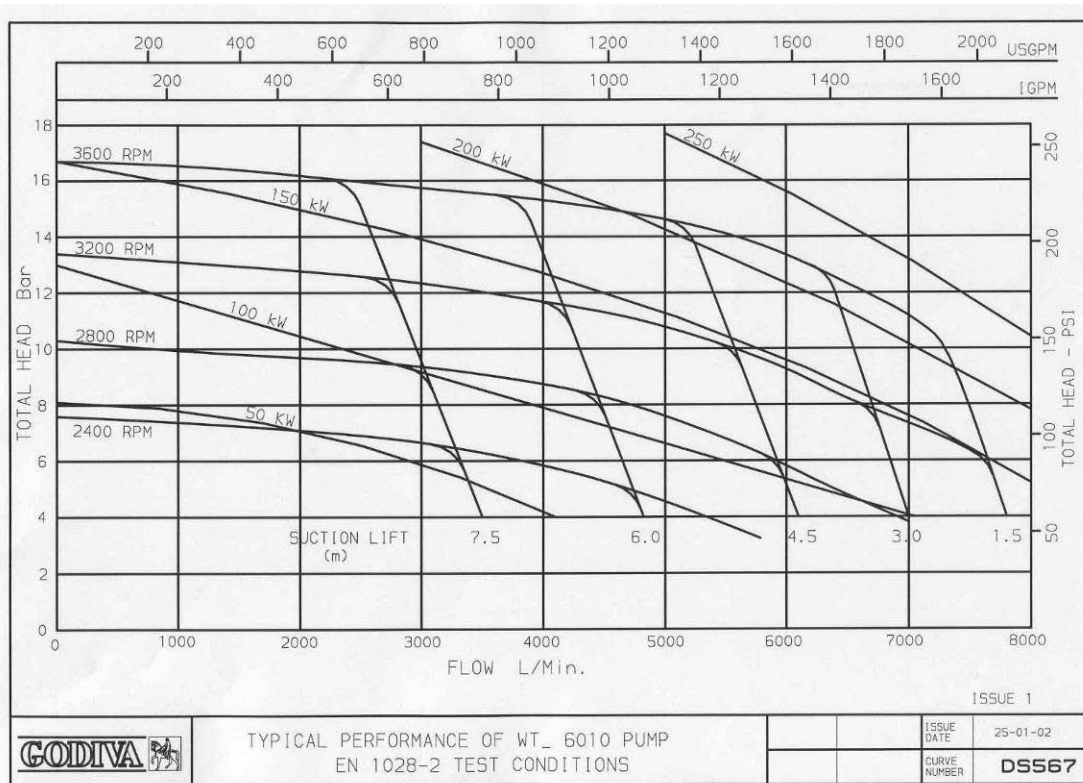
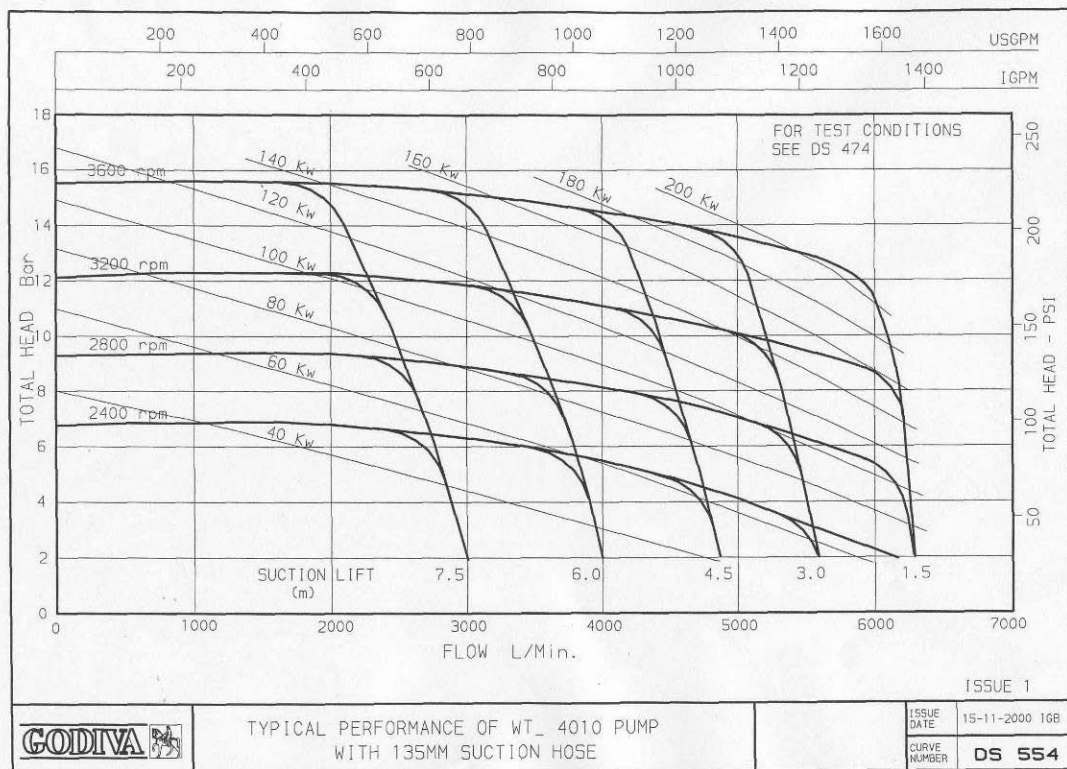
<p>Diagram 1</p> <p>Whilst the pump high pressure selector valve is in the open position, water which enters the high pressure stage during the low pressure mode will circulate back to the low pressure stage, thus preventing high pressure from being generated</p>	
<p>Diagram 2</p> <p>Shows the pump in operation when both high and low pressure may be used simultaneously – high pressure selector valve in the closed HP position.</p>	
<p>Diagram 3</p> <p>Shows the pump in operation in low and high pressure mode, with the HP selector valve closed. With the HP outlets closed, the pressure relief valve opens to permit excessive high pressure to circulate back to the low pressure stage to prevent over pressurisation.</p>	
<p>Diagram 4</p> <p>Illustrates an extreme case where the pump is in full operation with all outlets closed with both the pressure relief valve and thermal relief valve open to provide pressure and overheat protection.</p>	



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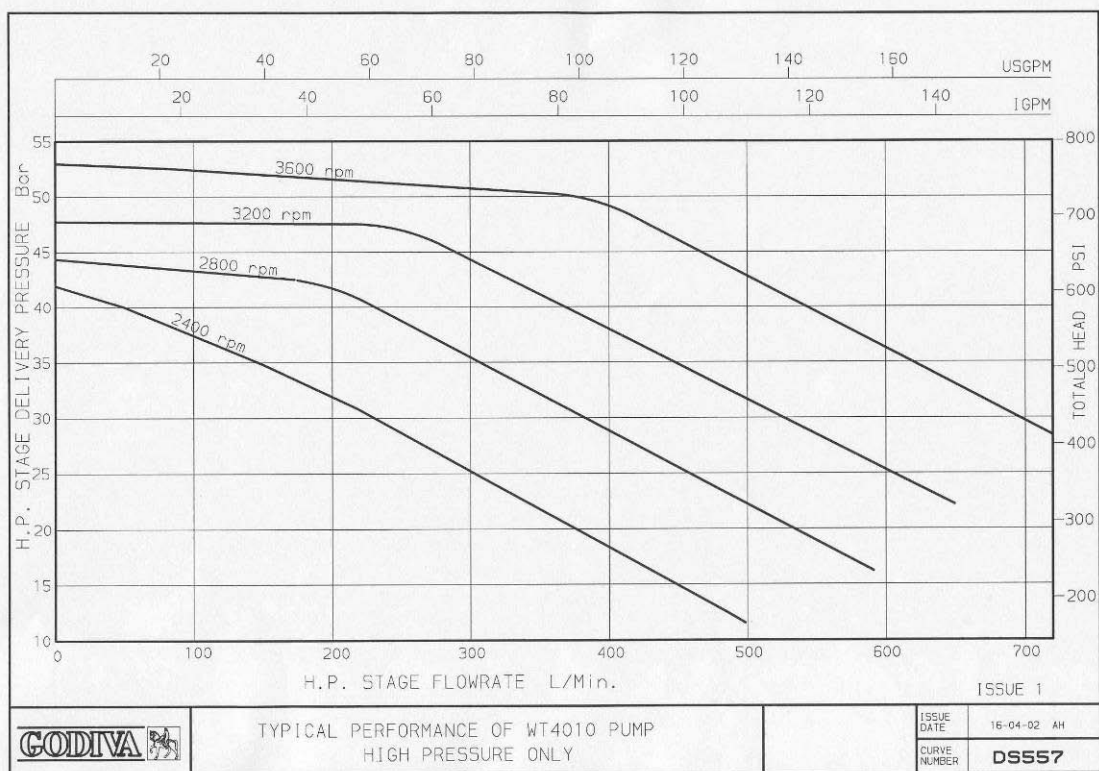
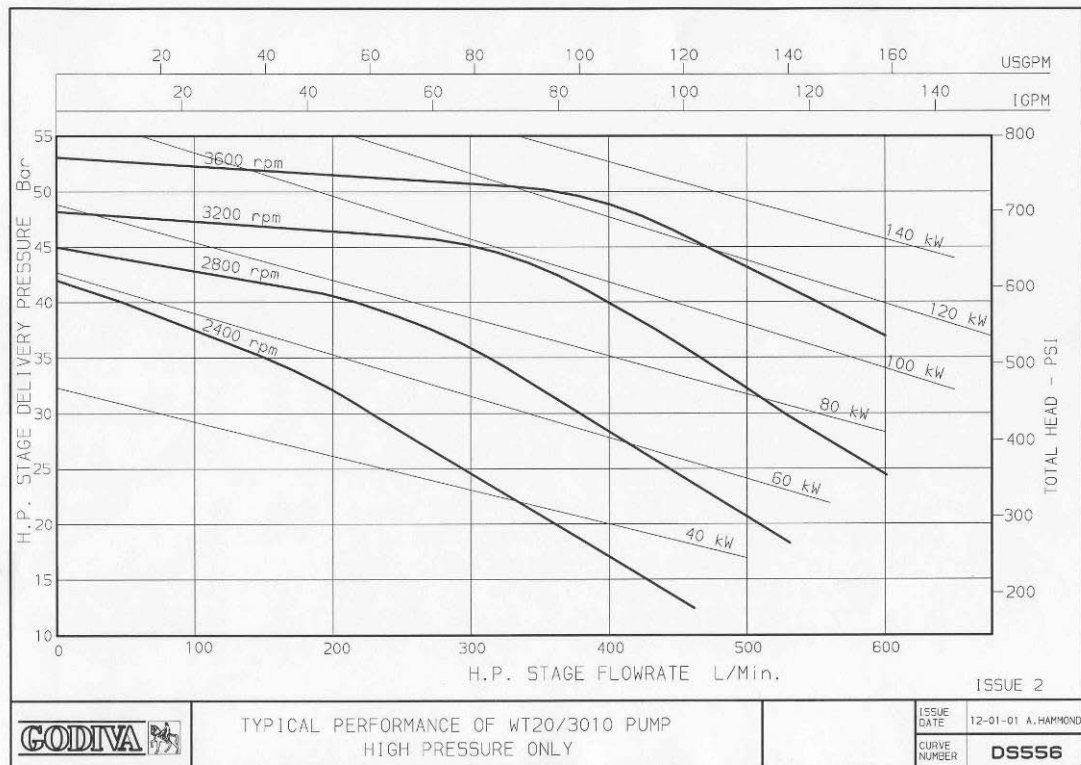
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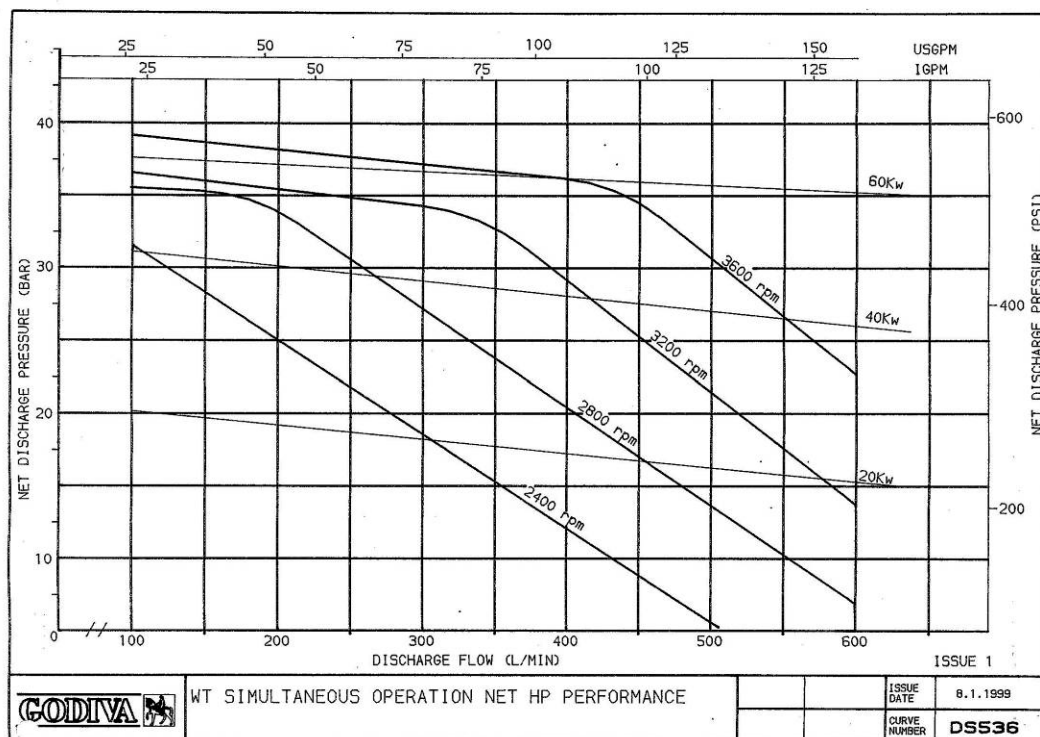
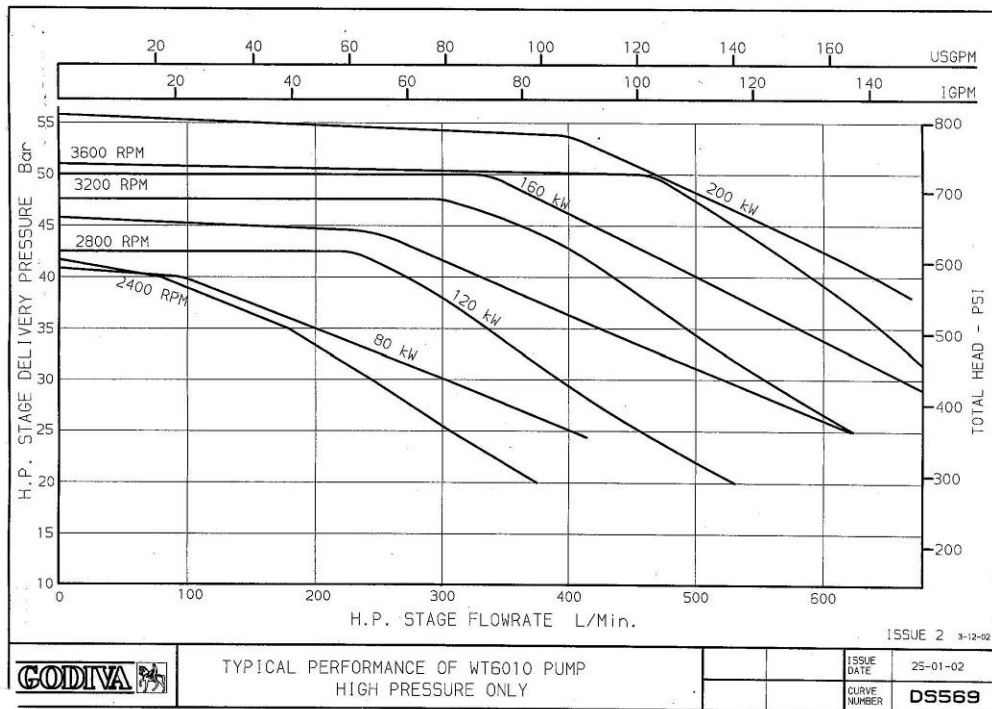
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			LP ONLY	HP ONLY	SIMULT.		
PUMP	LIFT	FLOW (LTRS/MIN)	2000	250	2000	250	
WT2010	3 METRES	TOTAL HEAD (bar)	10	40	7	34	
		RAW POWER (KW)	66	78	87		
		SPEED (RPM)	2960	2820	2640		
		TORQUE (Nm)	213	264	315		
			LP ONLY	HP ONLY	SIMULT.		
PUMP	LIFT	FLOW (LTRS/MIN)	3000	250	3000	250	
WT3010	3 METRES	TOTAL HEAD (bar)	10	40	7	41	
		RAW POWER (KW)	96	78	131		
		SPEED (RPM)	3210	2820	2980		
		TORQUE (Nm)	286	264	420		
			LP ONLY	HP ONLY	SIMULT.		
PUMP	LIFT	FLOW (LTRS/MIN)	4000	250	4000	250	
WT4010	3 METRES	TOTAL HEAD (bar)	10	40	7	34	
		RAW POWER (KW)	114	100	120		
		SPEED (RPM)	3060	2860	2690		
		TORQUE (Nm)	356	334	426		
			LP ONLY	HP ONLY	SIMULT.		
PUMP	LIFT	FLOW (LTRS/MIN)	6000	250	6000	250	
WT6010	3 METRES	TOTAL HEAD (bar)	10	40	7	37	
		RAW POWER (KW)	170	105	185		
		SPEED (RPM)	3300	2710	3020		
		TORQUE (Nm)	492	370	585		
<u>NOTE! H.P. PRESSURES ARE DISCHARGE PRESSURES</u> <u>ALSO A 10% MARGIN ON POWER MUST BE INCLUDED.</u>							
TYPICAL MAXIMUM PERFORMANCE					ISSUE 2 15/4/01		
REQUIREMENTS WT SERIES					IGB 10/00		
					DS550		

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G O D I V A L I M I T E D

INSTRUCTION ON USAGE OF PERFORMANCE CURVES

1. Performance based on cold clean water at (as per PREN 1028)
 - a) Standard atmospheric pressure (760mm Hg)
 - b) Standard water temperature = 4 °C
 - c) Air temperature up to 20 °C
2. Static lifts are referred to the centre line of the impeller at 760mm Hg atmospheric pressure and the suction hose lengths, unless specified, are as follows:

Lifts	* dia 4" (I.D.) Hose	* dia 5.5" (I.D.) Hose
Up to 1.5M	1 X 8' Length (2.4M)	1 X 10' Length (3.0M) + Strainer
3.0M	2 X 8' Length (2.4M)	2 X 10' Length (3.0M) + Strainer
4.5M	3 X 8' Length (2.4M)	2 X 10' Length (3.0M) + Strainer
6.1M	3 X 8' Length (2.4M)	3 X 10' Length (3.0M) + Strainer
7.6M	4 X 8' Length (2.4M)	3 X 10' Length (3.0M) + Strainer
8.0M	4 X 8' Length (2.4M)	3 X 10' Length (3.0M) + Strainer

* hose = Smooth bore rubber lined with spiral steel reinforcing

3. When selecting vehicle pumps a power safety margin must be allowed (X 1.10) to cover engine power tolerances.
4. Adjustments for S.G. change must be included on discharge pressure and power curves.

15/11/93

DS 474