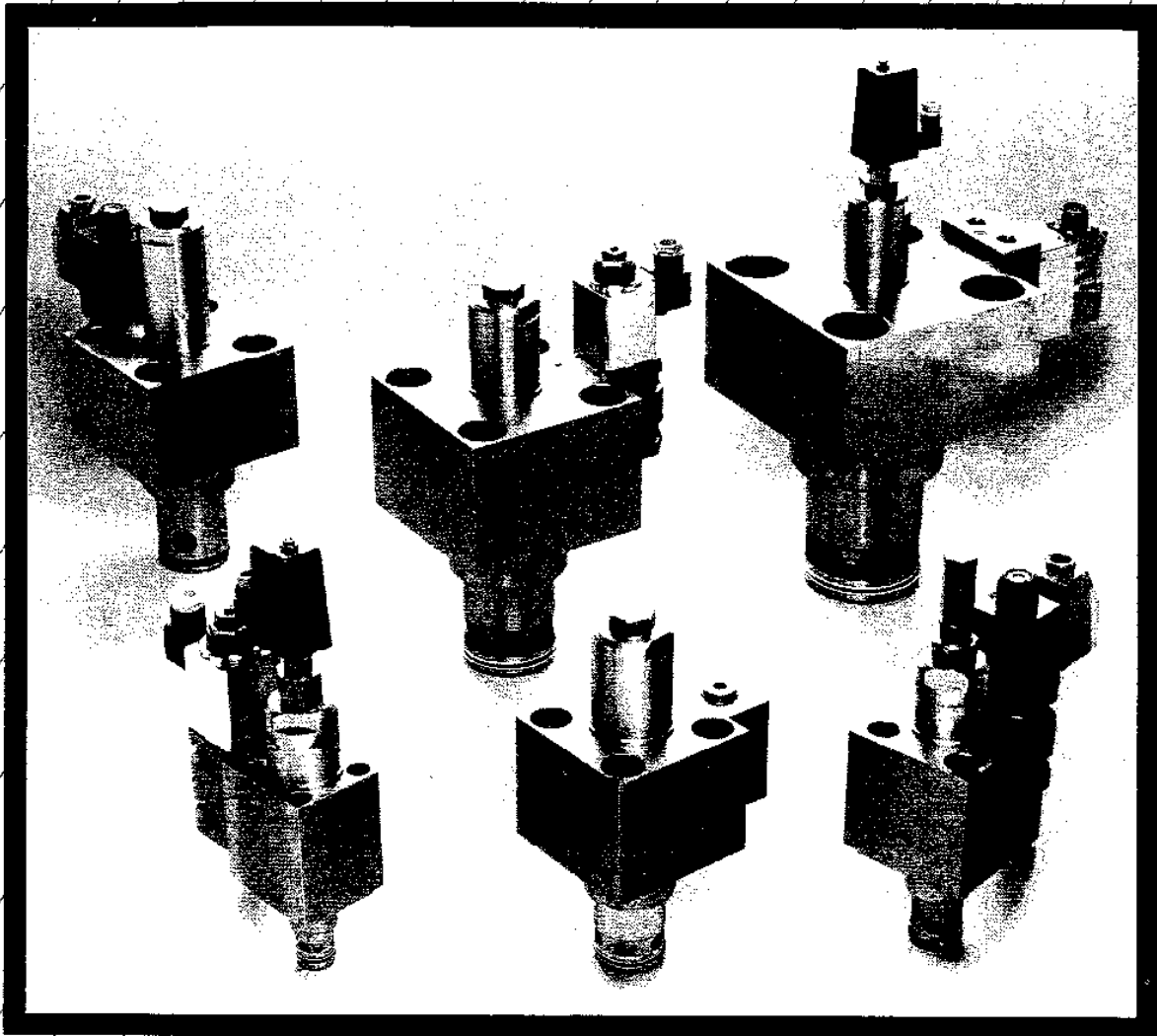


# Oilgear Towler

**VB.T. VB.W.  
2 PORT SEATED  
BYPASS VALVES.**



Bulletin 80225

# PERFORMANCE ASSURANCE IS STANDARD WITH EVERY OILGEAR TOWLER COMPONENT AND SYSTEM.

Every Oilgear Towler seated bypass valve manufactured is shipped with a corporate commitment to support it until it performs as specified.

This total dedication to performance is based upon experience gained since 1921 in matching fluid power equipment to a tremendous variety of machines and applications.

Oilgear Towler's Performance Assurance is made possible because of experience gained over the years in supplying machinery builders and users with unique solutions to thousands of unusual fluid power problems.

Historically, Oilgear Towler has concentrated its energies on hydraulic equipment and systems. Every Oilgear Towler facility is staffed with factory trained and field experienced application engineers.

Performance Assurance doesn't stop with the design of the system or the sale of the equipment. Oilgear Towler engineers will be there, when they are needed, supplying the technical support, field service, parts and repairs, to make sure each component or system operates correctly.



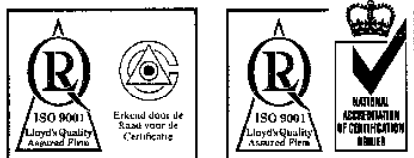
You the customer and user of the equipment, have a vital role to play in ensuring that components and systems are installed, operated and maintained in accordance with our recommendations. By doing this you will help us to achieve Performance Assurance, to our mutual benefit.

A major cause of damage to any system or component is FLUID CONTAMINATION. We take great care in specifying filtration in systems we design and for individual components. You are requested to read through this bulletin and contact us if you have any questions.

Data and information in this document may be changed at any time without notification, to incorporate new developments.

You are strongly recommended to check with Oilgear Towler that you have up-to-date information when designing with, specifying or purchasing equipment.

The final selection of components for use in systems and compliance with all operational, performance and safety requirements is the responsibility of the user.



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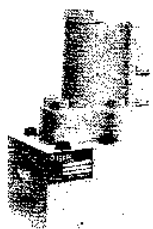
# 2 PORT SEATED BYPASS VALVES

## HIGH PRESSURE - HIGH FLOW MAIN STAGE CONTROLLED BY A LOW PRESSURE - LOW FLOW PILOT STAGE.



Internationally known as a world class hydraulics company, Oilgear Towler specialises in the design, engineering technology and equipment needed to solve difficult hydraulic problems by supplying the right components to meet specific needs.

This wide range of seated Bypass valves is part of Oilgear Towler extensive range of hydraulic components. Collectively they present a range of valves from which to choose. Individually, each has a distinct application advantage.



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## 2 PORT SEATED BYPASS VALVES

### PRINCIPLE OF OPERATION.

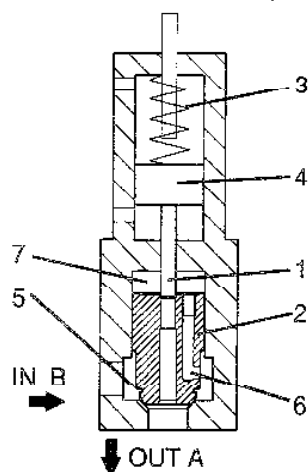
#### PRINCIPLE OF OPERATION

The function of this valve is to connect or isolate two parts of a hydraulic system, as and when required. The valve consists of two stages - a high pressure stage to control the main hydraulic system flow, and a low pressure pilot stage for the control and operation of the main valve. It can be supplied as either Normally Closed or Normally Open, according to system design requirements.

**OPERATION:** (description based on the Normally Closed version)

#### NORMALLY CLOSED POSITION

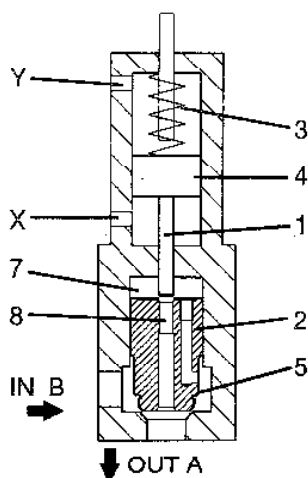
(Pilot Connection to Exhaust).



In this position, the Pilot Rod (1), is held seated in the top of the central drilling in the Main Poppet (2), by the force applied by the Spring (3) above the Pilot Piston (4). In addition to acting on the under-side of the annular shoulder (5) of the Main Poppet (2), pressure from the High Pressure Inlet B of the main valve passes through the small right-angle drilling (6), in the Main Poppet (2), to the Top Cavity (7) and pressurises the top of the Main Poppet. Due to the differential area between the top of the Main Poppet (2) and its Annular Shoulder (5), the Main Poppet (2) is positively held down on its seat thus isolating the Inlet Port B from the Outlet Port A.

#### CRACKING POSITION

(Pilot Supply to Pilot Connection).

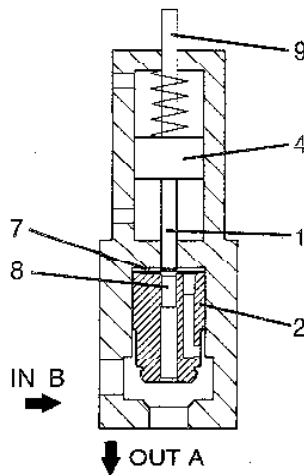


To open the valve, low pressure pilot supply (X) is directed to the under-side of the Pilot Piston (4) forcing it upwards against the loading of the Spring (3). This action lifts the lower end of the Pilot Rod (1) off its seat in the top of the Main Poppet (2), allowing the pressurised fluid in the Top Cavity (7) to be released down the central drilling (8) in the poppet (2). This causes the force acting on top of the Main Poppet (2) to fall to a level at which the high pressure inlet force acting on the under-side of the Annular Shoulder (5) is now greater, and lifts the Main Poppet (2) off its seat thus opening the valve to allow high pressure fluid to flow from the inlet B through to the secondary part of the hydraulic system, or exhaust to tank via outlet Port A.

## 2 PORT SEATED BYPASS VALVES. PRINCIPLE OF OPERATION.

### FULLY OPEN POSITION

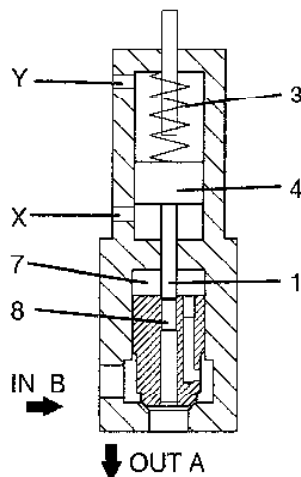
(Pilot Supply to Pilot Connection).



The Main Poppet (2) will continue to lift, at a speed controlled by the rate of movement of the Pilot Rod (1), until the top of the Pilot Piston (4) contacts the end of the Adjuster Stop (9) (or reaches the end of its stroke, when no adjustment is fitted). If the Main Poppet (2) tries to open too quickly it will contact the Pilot Rod (1) and so close off the central drilling (8), thus allowing pressure to build up again in the Top Cavity (6) and delay further movement of the Main Poppet (2) until the Pilot Rod (1) has continued its movement and opened the central drilling (8) again. The fully open position of the Main Poppet (2) can be varied by the Adjuster (9) and/or the type of Main Poppet (2) used, according to the design requirements of the system. The Main Poppet (2) is now held in its open position and fluid can flow freely from the High Pressure Inlet B through the valve to the Secondary part of the system A.

### TO CLOSE THE VALVE

(Pilot Connection to Exhaust).



The valve is closed by removing the low pressure Pilot Supply (X) and connecting the Pilot Inlet to exhaust. The Spring (3) forces the Pilot Piston (4) downwards until the Pilot Rod (1) seats in the central drilling (8) in the Main Poppet (2). The force of the Spring (3) plus the pressure build up in the Top Cavity (7) re-establishing the differential area ratio, thus pushes the Main Poppet (2) down on to its seat preventing any further flow through the main valve.

### NORMALLY OPEN VALVES

Normally open valves have spring (3) fitted below pilot piston (4) so that in the normal position the pilot rod (1) is held up, and pilot pressure is applied to the top of the piston to close the valve.

When pressure A is higher than that in B these valves can open, depending on size and design. In some cases it may be necessary to use check valves to prevent flow from A to B.

In the case of the smaller, direct acting, Bypass Valves there is no main poppet and the control of flow through the valve is by the Pilot Rod seating directly in the base of the main Valve Chamber, flow can be passed in both directions.

## 2 PORT SEATED BYPASS VALVES

### IMPORTANT DESIGN FEATURES.

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This range of heavy duty 2 port bypass valves is based on principles developed over the past 50 years by Oilgear Towler, are for use on hydraulic systems using a variety of fluids.

There are several important design features in these valves:-

**1. Low pressure pilot actuation.**

A low pressure pilot of 35 bar will control the valve when high pressure is working in the main stage. The pilot supply pressure is applied at 35 bar for any main pressure being used. The advantages of this design is that relatively high spring forces are used, without affecting pressure drop in the main stage, to ensure positive seating of the valves. The constant pilot supply also ensures a constant speed of opening and closing of the valve despite changes in main pressure, so eliminating shock and decompression effects in the system. Pilot valve life is increased, and internal leakage in the pilot system is small.

**2. Fail-Safe feature.**

If at any time pilot supply fails the valve will return to its normal position.

**3. Multiple sequencing operation.**

A special feature of the valve is the extra port "W" which can be used to pilot actuate other valves either simultaneously in phase with the first valve according to the design. If the first valve is solenoid pilot operated, valves using port "W" as a pilot feed will not be actuated until the first solenoid is energised. Several valves can be controlled from one solenoid. Connection "W" is only available on normally closed solenoid pilot valves and is only connected at full opening of the valve in the phased sequence type.

**4. Normally open or normally closed versions.**

Normally open and normally closed versions are available. The normally open valve is arranged to be spring actuated to the open position and the normally closed spring actuated to closed position.

**5. Pilot or integral solenoid pilot operation.**

Application of pilot pressure to "X" on pilot types, or actuating solenoids with a pilot supply on "X" will move the valve from its normal position.

**6. Seated poppet for low leakage.**

The seated design ensures positive closing of the valves, and poppets are shaped to prevent erosion in the valve. Several poppet shapes are available to suit system design requirements.

**7. Direction of flow.**

The valves should always be arranged so that the flow direction is always one way. Standard characteristics are to flow into the poppet side :-

Flow A to B For Manifold Mounting Versions.

Flow B to A For Slip-in Cartridge Versions.

Only the 06 single stage type can accept flows in both directions.

## 2 PORT SEATED BYPASS VALVES. IMPORTANT DESIGN FEATURES.

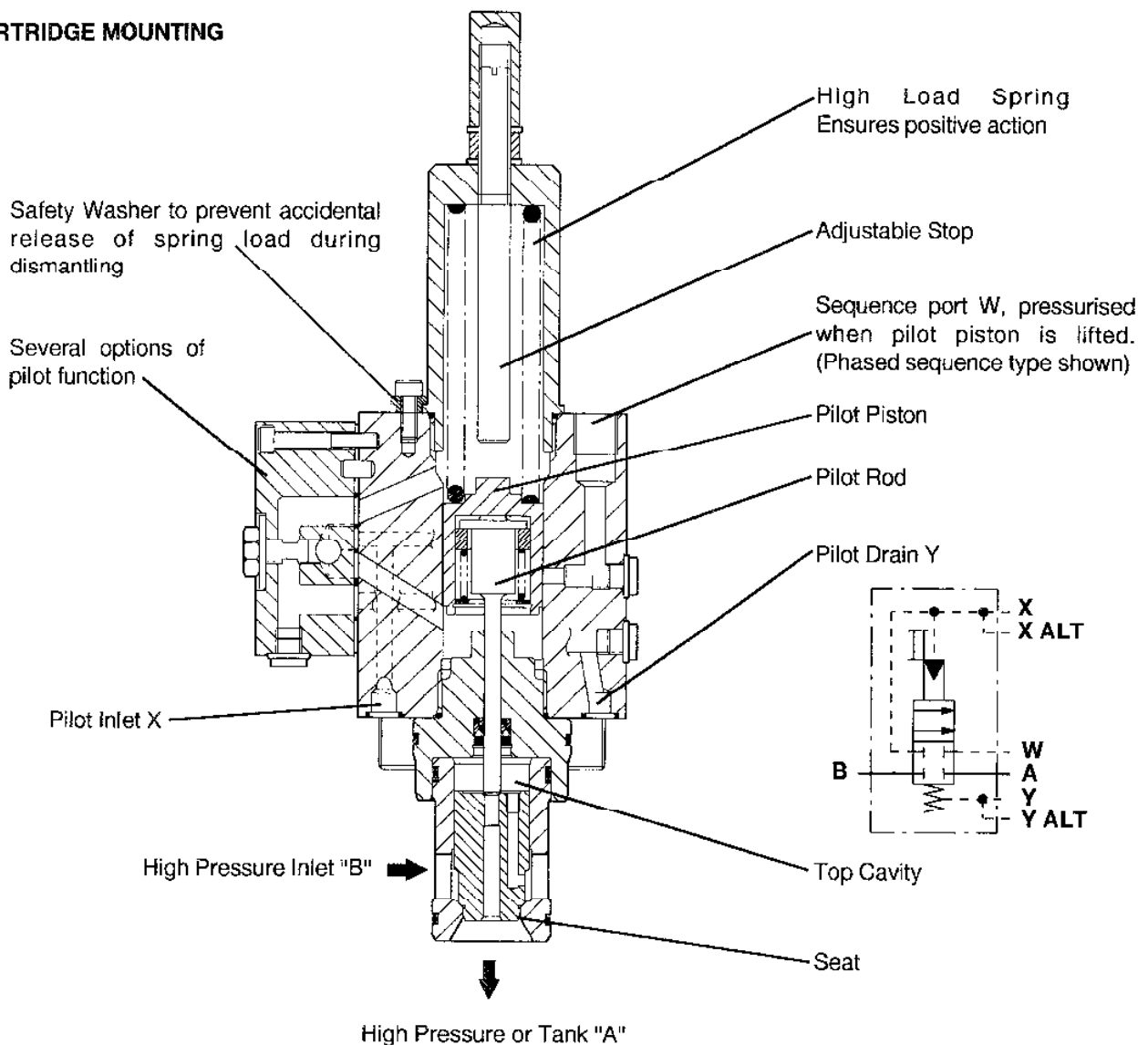
### 8. Materials.

Valves can be made from various materials to suit applications. Carbon Steel is standard but the poppet and sleeve can be manufactured from Stainless, Brass Plated and Ceramic. Consult Oilgear Towler, Leeds.

### 9. Multi Fluids.

Valves are available to use oil as pilot supply and special fluids on main systems. A special drain port is provided.

### CARTRIDGE MOUNTING

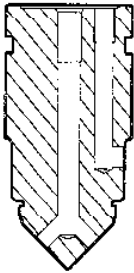


Valves detailed in this bulletin are :- **VB**T (Cartridge and Manifold) mounting for oil and **VB**W (Manifold mounting for HWBF fluids) 2 port, 2 position valves.

Other valves in this category are :- **VB**D (Descaling valve), **VB**F (Forge valve - especially for forging press systems), **VB**P (Proportional valves) and **VB**S (Servo operated valves).

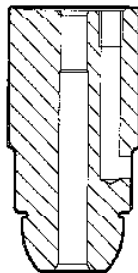
## 2 PORT SEATED BYPASS VALVES SUPPLEMENTARY FEATURES.

In addition to the standard poppet there are also available other poppets for use with different fluids and various applications.



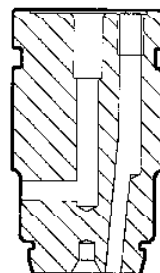
Cone pointed poppet specially developed for 95/5 systems.

CODE P



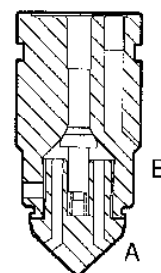
Spherical nose poppets designed specifically for individual requirements e.g. for controlled decompression.

CODE R for std. shape  
CODE Y special shape



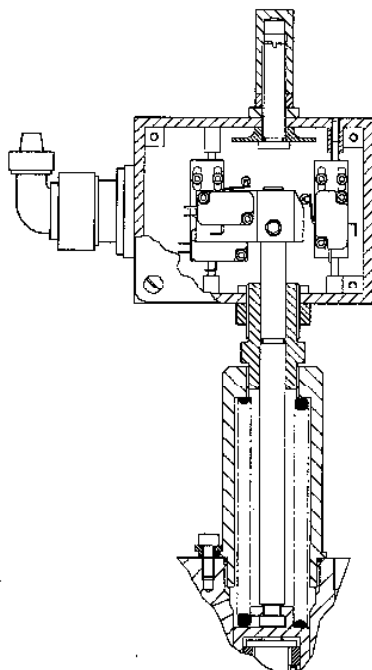
Reverse flow poppets only for special use. Consult Oilgear Towler Leeds. This style is not suitable for all applications.

CODE T



Poppets for use on either oil or 95/5 with flow in both directions. Pressure in B must always be higher than A for valve to close.

CODE C



To ensure that a machine is safe and in a fully interlocked condition, there is available a simple attachment that replaces the standard top closure and it comprises, 3 switches one of which is a fully safe type and indicates safe closed position, the others indicate closed and maximum opening positions.

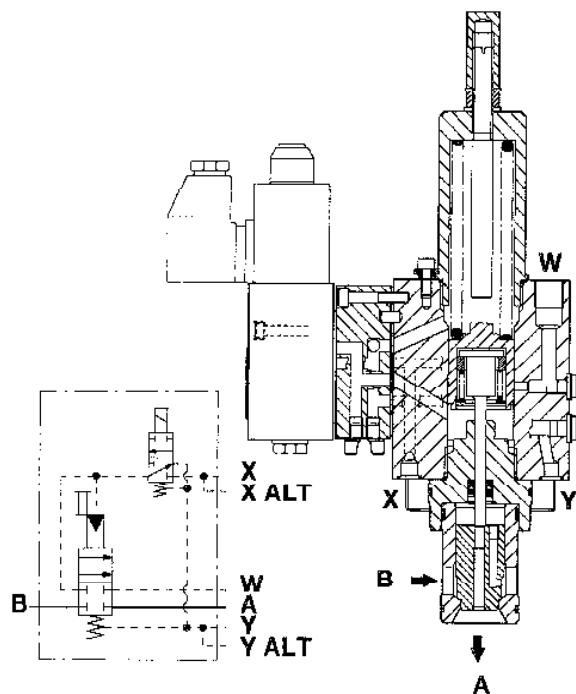
Other switches using inductive voltage can also be fitted. This type of switch may not comply to local safety requirements.

CODE F as shown

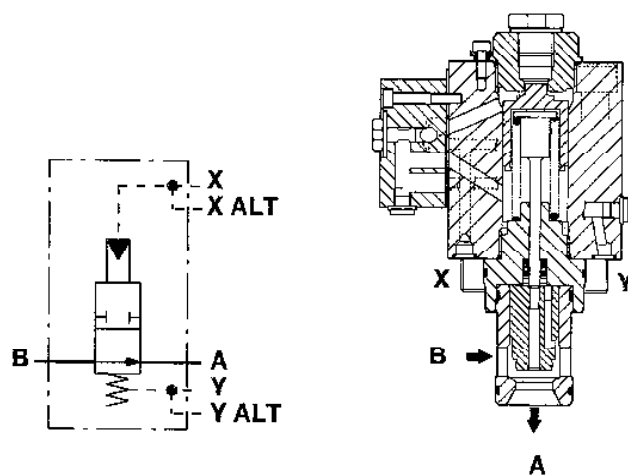
CODE M Induction position switch



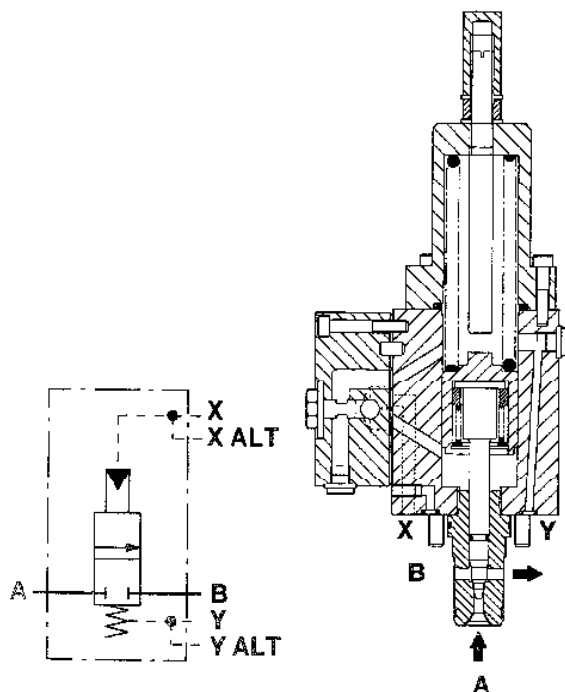
**VBT - \*\*\*C**  
**2 PORT SEATED BYPASS VALVES.**  
**SLIP IN CARTRIDGE TO ISO7368.**



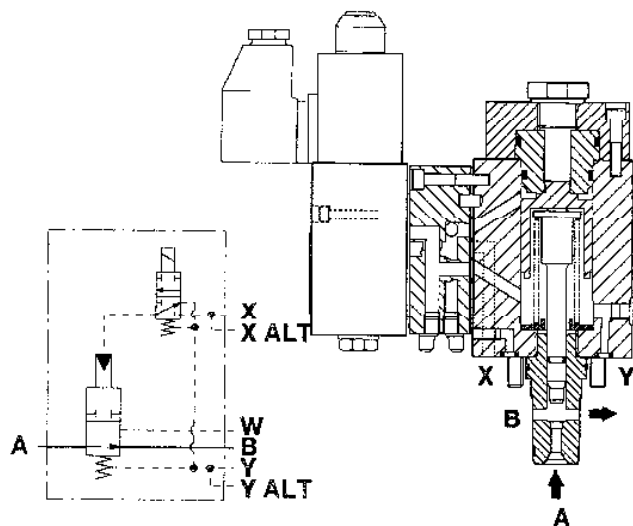
**2 Stage Normally closed solenoid pilot operated.**  
**VBTSE09C-50SHGABBA1 / 229132C / VDSHS02**  
**H3-3JA1ND\*\*NBBA1**



**2 Stage Normally open pilot operated.**  
**VBTPA09C-50SHBNBBA1**



**Single Stage Normally closed pilot operated.**  
**VBTPM06C-50RHBABBA1**



**Single Stage Normally open solenoid pilot operated.**  
**VBTSK06C-50PHBNBBA1 / 229132C / VDSHS02H3-3**  
**JA1ND\*\*NBBA1**

## VB T - \*\* C

2 PORT SEATED BYPASS VALVES.  
SLIP IN CARTRIDGE TO ISO7368.  
HOW TO ORDER.

Block Number Explanation	1	2	3	4	5	6	7		8	9	10	11	12	13	14	15
Valve Example	V	B	T	*	*	**	*	—	**	*	H	*	*	B	*	A1

### 1 UNIT

**V** Valve

### 2 BASIC FORM

**B** 2 port seated bypass

### 3 VALVE TYPE

**T** 2 position standard

### 4 CONTROL (see page 35)

**P** Pilot

**C** Pilot with reset choke

**S** Solenoid/elec pilot

**F** Pilot separate fluids drained

**H** Solenoid/elec pilot separate fluids drained

### 5 CONSTRUCTION (see page 35)

**A** 2 stage normally open

**C** 2 stage normally closed (not size 13)

**D** 2 stage normally closed pilot both ways

**E** As "C" with phased sequence

**F** As "E" with pilot both ways

**K** 1 stage normally open

**L** 1 stage normally closed

**M** 1 stage normally closed phased sequence

### 6 NOM SIZE TO ISO7368

**06** (Direct only)

**09**

**10**

**12**

**13**

### 7 MOUNTING PATTERN

**C** Slip in cartridge to ISO7368

**CA** As "C" with larger bolts

### 8 MAX WORKING PRESSURE

Size	Code	Bar
06C	<b>50</b>	500
09C	<b>50</b>	500
10C	<b>50</b>	500
12C	<b>50</b>	500
13C	<b>45</b>	450
13CA	<b>50</b>	500

### 9 POPPET SHAPE (2 STAGE VALVES)

**S** Standard + Cushion (oil)

**P** Point for 95/5 (90° Cone)

**R** Spherical nose (oil)

**E** Extended point 95/5 (90° Cone)

**C** With check for 2 way flow

**T** With cushion (oil), special request, flow A - B

**Y** Special shape

### POPPET SHAPE (SINGLE STAGE VALVES)

**C** Ø4,4 seat, Ø3,4 nose

**P** Ø8 seat, flat end

**R** Ø8 seat Ø5,38 nose

**U** Ø0,17 seat, flat end

### 10 SPRINGS

**H** Standard

**VB T - \* \* C**  
**2 PORT SEATED BYPASS VALVES.**  
**SLIP IN CARTRIDGE TO ISO7368.**  
**HOW TO ORDER.**

**11 PILOT CONNECTIONS**

- B** X and Y Line and Manifold option  
**G** X and Y line - Manifold option - pilot sequence - N/C valves  
**Y** Special connections

**12 TOP CAP ASSEMBLY**

- N** Standard - No adjustment  
**A** With opening adjustment always with N/C valves  
**F** 3 switches inc. safety with adjustment of lift  
**M** Induction position switch with no lift adjustment

**13 DIMENSIONS**

- B** Metric with BSP Port threads

**14 SEALS**

- B** Buna N  
**V** Viton  
**E** E.P.D.M  
**Z** Special

**15 DESIGN SERIES**

- A1** Assigned by factory

/ Pilot valve required.

**SOLENOID PILOT VALVE**

For sizes 06, 09, 10 and 12 use :-

/ 229132C / VDSHS02H3-3JA1ND\* \*NBBA1  
 / Block / Valve

For size 13 or others where pilot piston is driven in both directions use :-

VDSHS03D-31B1ND\* \*NBBA1

Voltage and cap	* *
110V AC with lamp and rectifier	AA
250V AC with lamp and rectifier	CA
24V DC with lamp	JL
98V DC with lamp	PL
198V DC with lamp	TL

# **VB T - ★ ★ C**

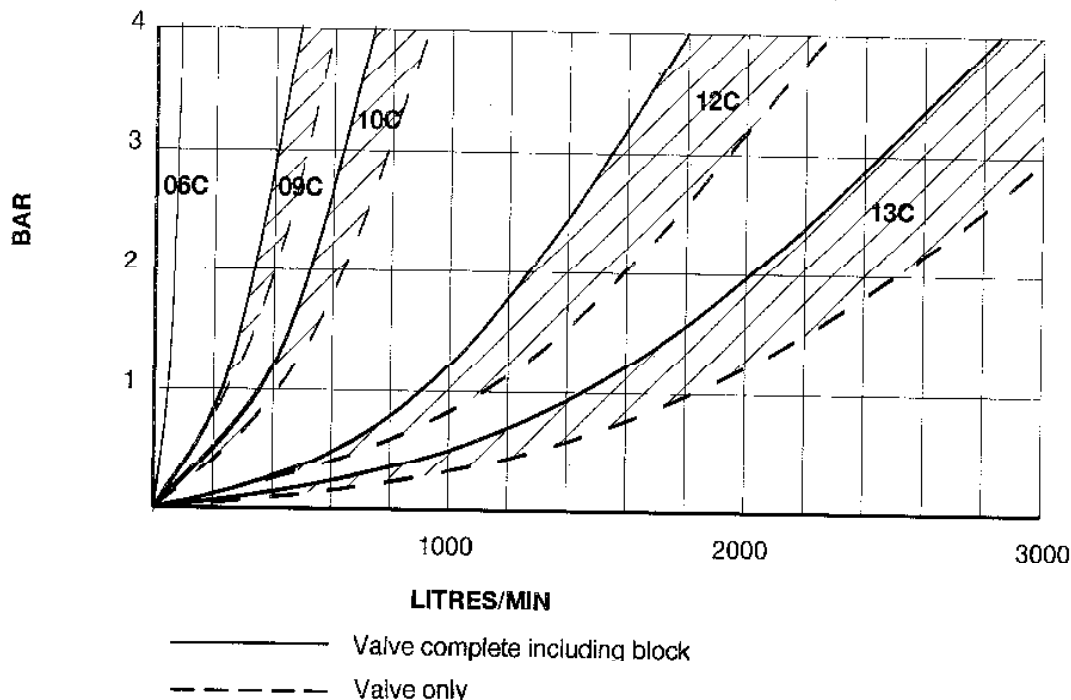
**2 PORT SEATED BYPASS VALVES.**

**SLIP IN CARTRIDGE TO ISO7368.**

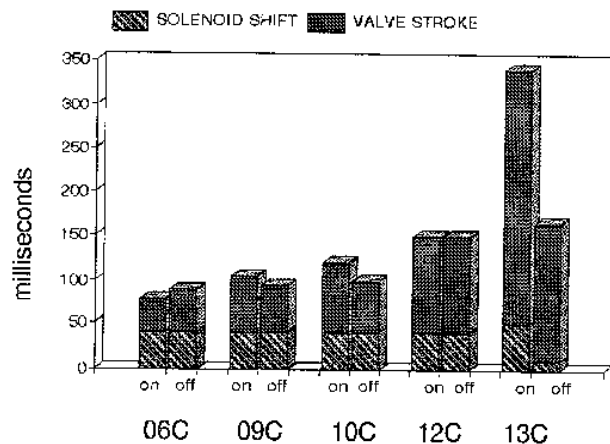
**PERFORMANCE DATA.**

All testing generally in accordance with BS4062 part 1 up to a max flow of 1000 l/min.

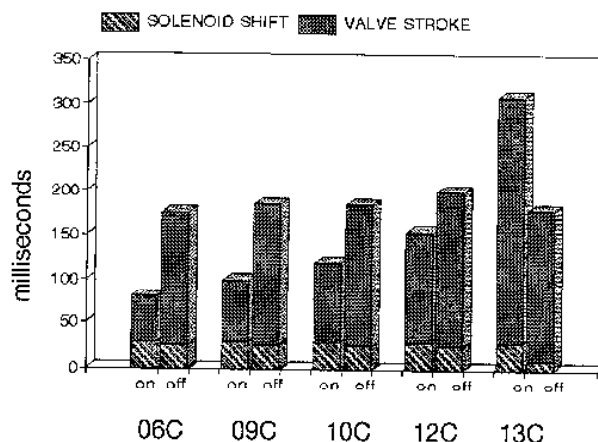
"Fluid" - mineral oil, 32 centistokes at 40°C and solenoid voltage nominal -10%, Pilot pressure 35 bar.



## **NORMALLY CLOSED**



## **NORMALLY OPEN**

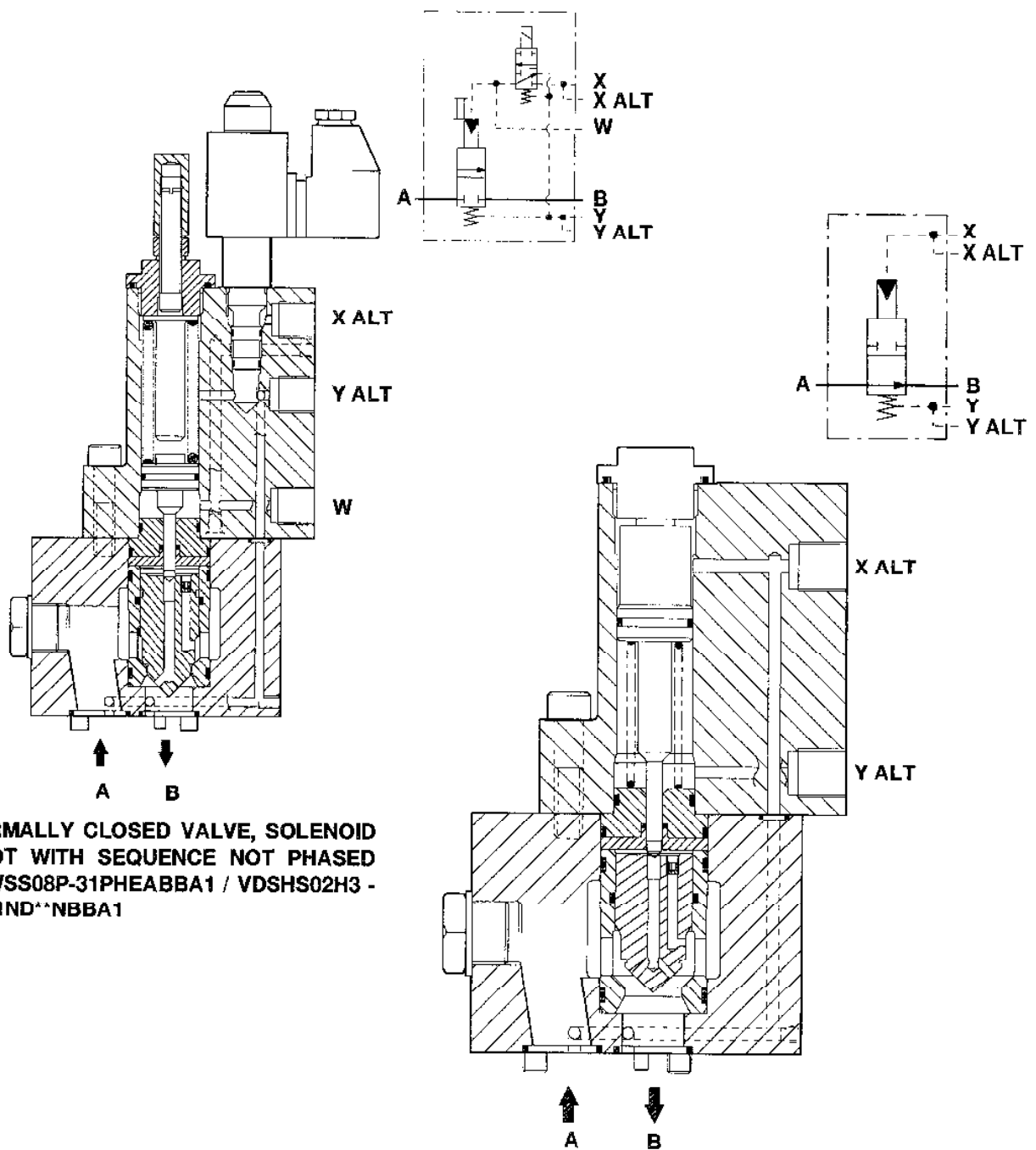


Volume of Pilot fluid required for full stroke (ml)	
06C	11,4
09C	13,7
10C	15,4
12C	25,1
13C	22,0

**Note:-** Switching times for "off" will increase substantially if diodes are used to prevent back emf voltage surges, or rectifiers are fitted in cap. Allow 100m/s for solenoid shift at switch off for all sizes except 13C. For 13C allow 60m/s. 13C valves include orifice in pilot stage port P to create controlled operating speed.

Pilot pressure (bar)	
Minimum	17
Recommended	35
Maximum	70

**VBW - \*\*P**  
**2 PORT SEATED SWITCHING VALVES**  
**MANIFOLD MOUNTING TO ISO5781**  
**FOR USE WITH HWBF FLUIDS.**



## VBW - \*\*\*P

2 PORT SEATED SWITCHING VALVES  
MANIFOLD MOUNTING TO ISO5781  
FOR USE WITH HWBF FLUIDS  
HOW TO ORDER.

Block Number Explanation	1	2	3	4	5	6	7		8	9	10	11	12	13	14	15
Valve Example	V	B	W	*	*	**	P	—	31	*	H	*	*	B	*	A1

### 1 UNIT

**V** Valve

### 2 BASIC FORM

**B** 2 port seated bypass

### 3 VALVE TYPE

**W** HWBF Design

### 4 CONTROL

**S** Solenoid pilot

**P** Pilot

### 5 CONSTRUCTION

#### 2 STAGE VALVES

**A** Normally open

**S** Normally closed with sequence  
(see page 35)

#### SINGLE STAGE

**K** Normally open

**L** Normally closed

**R** Normally closed with sequence

### 6 NOMINAL SIZE TO ISO5781

**06** (Single and 2 stage available)

**08**

**10**

### 7 MOUNTING PATTERN

**P** Manifold mounting to ISO5781

### 8 MAX WORKING PRESSURE

**31**=310 Bar

### 9 POPPET SHAPE (2 STAGE VALVES)

**P** Point for 95/5 (90° Cone)

**E** Extended point 95/5 (90° Cone)

### POPPET SHAPE (SINGLE STAGE VALVES)

**E** Ø6,35 Seat, 90° Point

**F** Ø9,55 Seat, 90° Point

### 10 SPRINGS

**H** Standard

### 11 PILOT CONNECTIONS (See page 35)

**B** X and Y Line and Manifold option (N/O)

**E** X and Y Line - Manifold option - Pilot  
sequence not phased

### 12 TOP CAP ASSEMBLY

**N** Standard - No adjustment

**A** With opening adjustment

### 13 DIMENSIONS

**B** Metric with BSP Port threads

### 14 SEALS

**B** Buna N

**V** Viton

**E** E.P.D.M

### 15 DESIGN SERIES

**A1** Assigned by factory

/ Pilot Valve Required

### SOLENOID PILOT VALVE

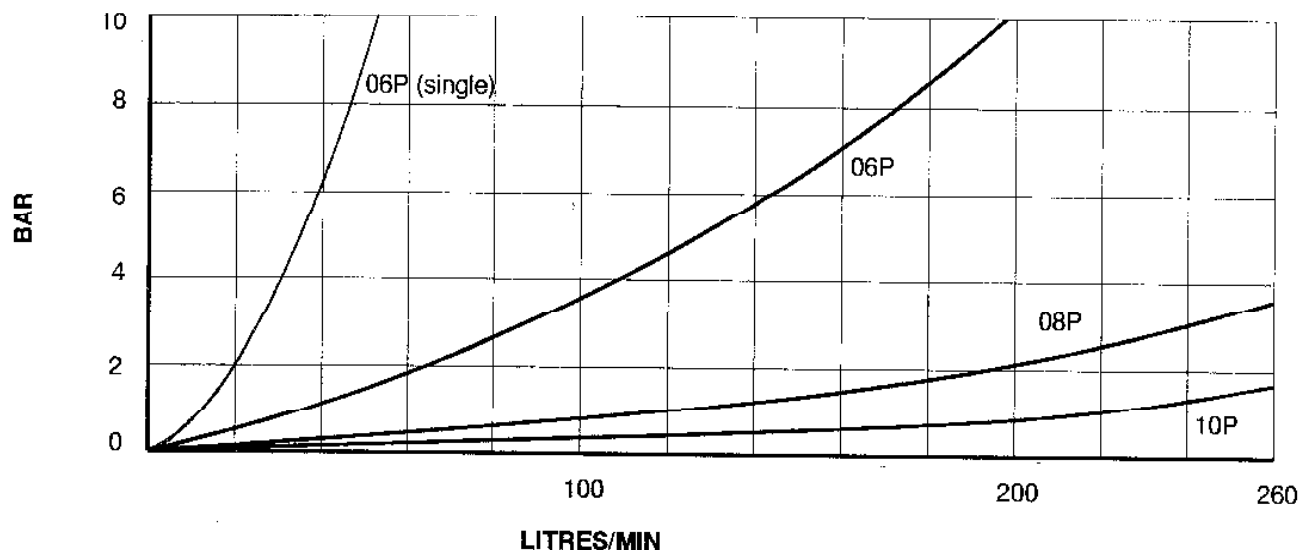
VDSHS02H3-3JA1ND\*\*NBBA1

Voltage and cap	**
110V AC with lamp and rectifier	AA
250V AC with lamp and rectifier	CA
24V DC with lamp	JL
98V DC with lamp	PL
198V DC with lamp	TL

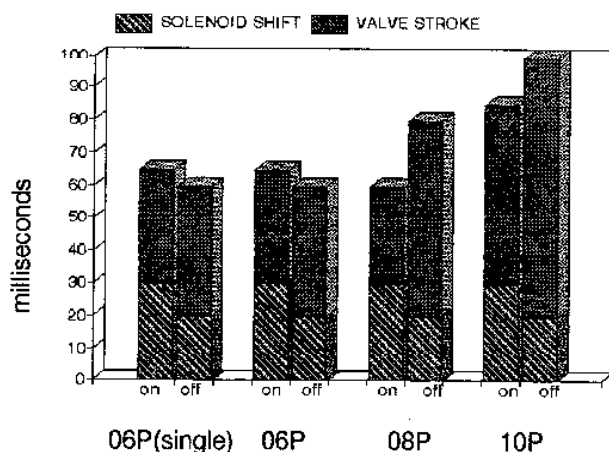
# **VBW - ★★P** **2 PORT SEATED SWITCHING VALVES** **MANIFOLD MOUNTING TO ISO5781** **FOR USE WITH HWBF FLUIDS** **PERFORMANCE DATA.**

All testing generally in accordance with BS4062 part 1

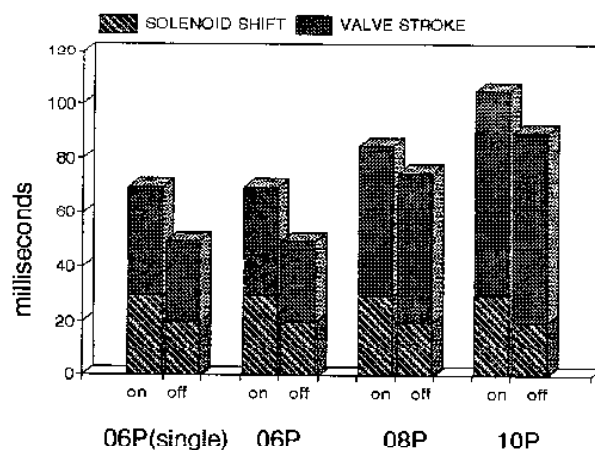
"Fluid" - mineral oil, 32 centistokes at 40°C, solenoid voltage nominal -10%, Pilot pressure 35 bar and 95/5 micro emulsion at 1 centistoke at 30°C



**NORMALLY CLOSED**



**NORMALLY OPEN**

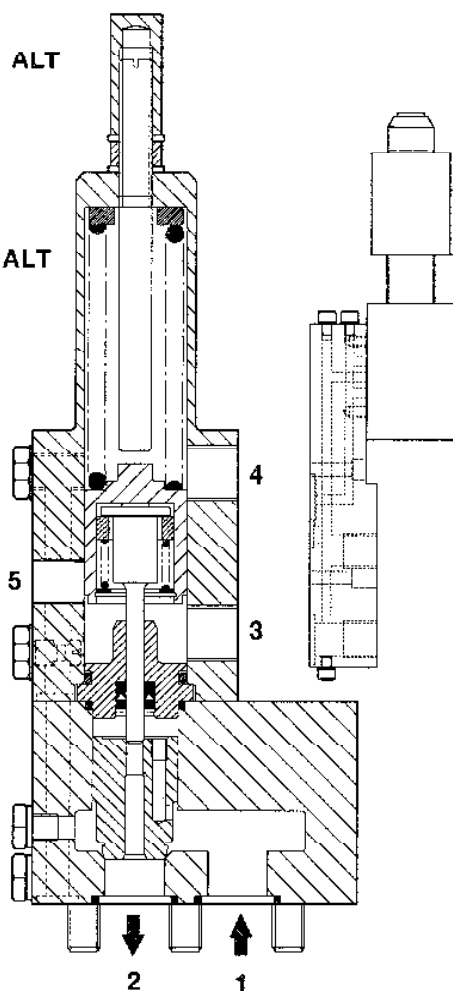
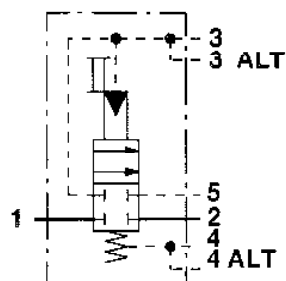


Volume of Pilot fluid required for full stroke (ml)	
06P All models	7,9
08P	9,5
10P	10,7

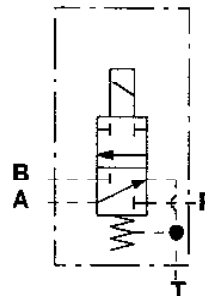
**Note:-** Switching times for "off" will increase substantially if diodes are used to prevent back emf voltage surges, or rectifiers are fitted in cap. Allow 100m/s for solenoid shift at switch off.

Pilot pressure (bar)	
Minimum	17
Recommended	35
Maximum	70

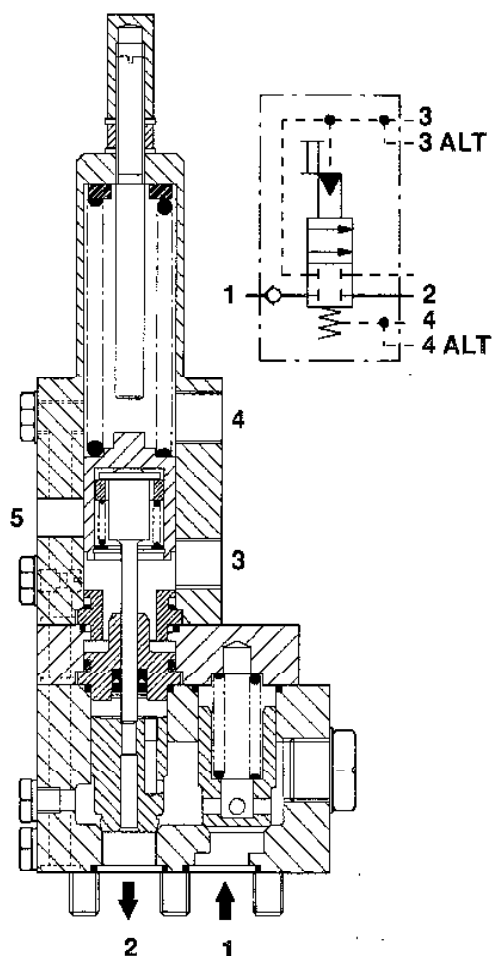
**VBT - \*\*T OR E**  
**2 PORT SEATED BYPASS VALVES**  
**HOUSE STANDARD MANIFOLD MOUNTING**  
**480 BAR AND 1200 BAR RANGES.**



**NORMALLY CLOSED VALVE PILOT OPERATED,  
 WITH PHASED SEQUENCE**  
**VBTP08T-48SHGAKBA1**



**SOLENOID PILOT VALVE**  
**V05123 / VDSHS02H3-3JA1ND\*\*NBBA1**



**NORMALLY CLOSED VALVE PILOT OPERATED,  
 WITH PHASED SEQUENCE**  
**VBTPG08T-48SHGAKBA1**



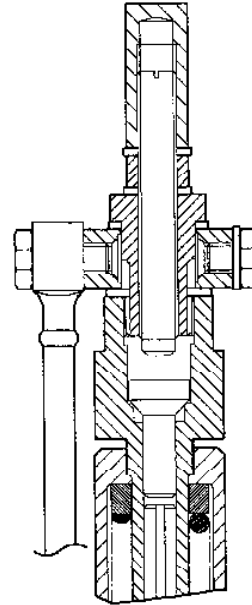
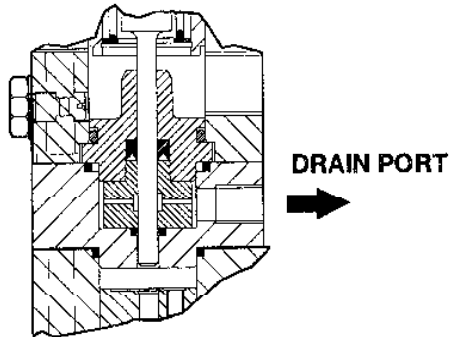
## VBT- \*\*T OR E

2 PORT SEATED BYPASS VALVES

HOUSE STANDARD MANIFOLD MOUNTING

480 BAR AND 1200 BAR RANGES.

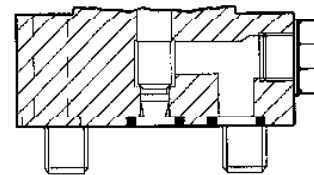
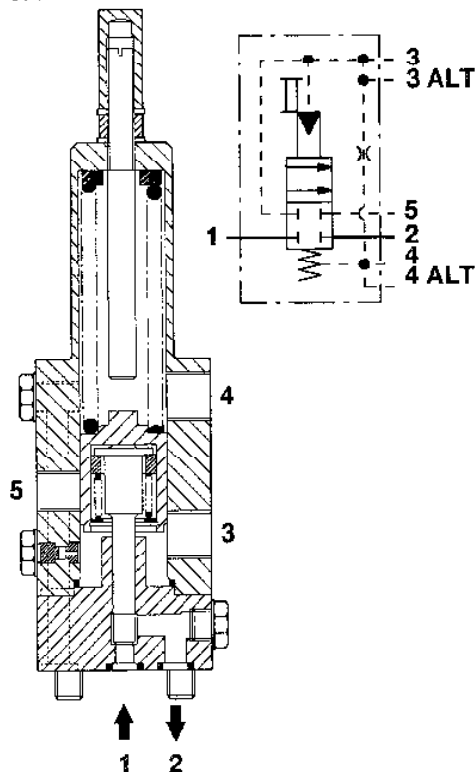
### ADDITIONAL OPTIONS



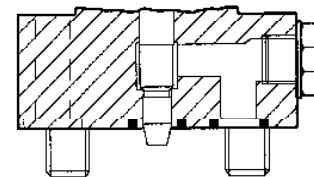
### CONSTRUCTION TO SEPARATE FLUIDS

### DECOMPRESSION DEVICE D

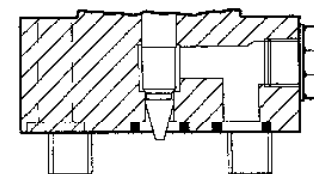
### SINGLE STAGE VALVES



POPPET H



POPPET J



POPPET K

NORMALLY CLOSED VALVE PILOT OPERATED  
WITH PHASED SEQUENCE, POPPET G  
VBTCMO4T-48GHKAKBA1

**VBT - \*\*T OR E**  
**2 PORT SEATED BYPASS VALVES**  
**HOUSE STANDARD MANIFOLD MOUNTING**  
**480 BAR AND 1200 BAR RANGES**  
**HOW TO ORDER.**

Block Number Explanation	1	2	3	4	5	6	7		8	9	10	11	12	13	14	15
Valve Example	V	B	T	*	*	**	*	—	**	*	*	*	*	*	*	A1

**1 UNIT**

**V** Valve

**2 BASIC FORM**

**B** 2 port seated bypass

**3 VALVE TYPE**

**T** 2 Position standard

**4 CONTROL (see page 35)**

**P** Pilot

**C** Pilot with reset choke

**S** Solenoid pilot

**F** Pilot, Separate Fluids, Drain

**H** Sol/Elec Pilot, Separate fluids, Drain

**5 CONSTRUCTION (see page 35)**

**2 STAGE VALVES**

**A** Normally open

**B** Normally open, Pilot both ways

**E** Normally closed with sequence

**F** As "E" with pilot both ways

**G** Normally closed, Phased sequence with built in full flow check

**H** As "G" with pilot both ways

**SINGLE STAGE**

**K** Normally open

**M** Normally closed with sequence

**6 NOMINAL SIZE**

**Non Standard Centres**

**03**

**04**

**08**

**12**

**16** Only available for 480 Bar working pressure

**24** Only available for 480 Bar working pressure

**7 MOUNTING PATTERN**

**T** For 480 Bar

**E** For 1200 Bar

**8 MAX WORKING PRESSURE**

**48**=480 Bar

**A2**=1200 Bar

**9 POPPET SHAPE (2 STAGE VALVES)**

**S** Standard + Cushion (oil)

**R** Spherical nose (oil)

**Y** Special shape

**POPPET SHAPE (SINGLE STAGE VALVES)**

**SIZE 03**

**C** Ø4,4 seat, Ø3,4 nose

**P** Ø8 seat, flat end

**R** Ø8 seat Ø5,38 nose

**U** Ø3,17 seat, flat end

**SIZE 04**

**G** Ø9 seat, flat end

**H** Ø9 seat, Ø7,9 mask

**J** Ø9 seat, long mask

**K** Ø9 seat, 15° point

**VB-T- \*\*T O R E**  
**2 PORT SEATED BYPASS VALVES**  
**HOUSE STANDARD MANIFOLD MOUNTING**  
**480 BAR AND 1200 BAR RANGES**  
**HOW TO ORDER.**

---

**10 SPRINGS**

**2 Stage Valves**

**H** Standard

**1 Stage Valves**

**H** Standard

**M** Medium

**L** Low

**11 PILOT CONNECTIONS (see page 35)**

**B** X and Y Line and Manifold option

**G** X and Y Line and Manifold option and phased sequence

**K** Pilot X in manifold and line option with internal drain

**12 TOP CAP ASSEMBLY**

**N** Standard - No adjustment

**A** With opening adjustment

**F** 3 switches inc. safety with adjustment

**S** Single signal switch

**K** 3 switches inc. safety with no adjustment

**13 DIMENSIONS**

**G** UK imperial

**K** UK Imperial with metric fixings

**14 SEALS**

**B** Buna N

**V** Viton

**E** E.P.D.M

**Z** Special

**15 DESIGN SERIES**

**A1** Assigned by factory

/ Pilot valve required and / extras.

**Pilot valve**

V05123 / VDSHS02H3-3JA1ND\*\*NBBA1

**SOLENOID PILOT VALVE**

For sizes 03, 04, 08, 12 and 16 use :-

/ 229132C / VDSHS02H3-3JA1ND\*\*NBBA1

/ Block / Valve

For size 24 or others where pilot piston is driven in both directions use :-

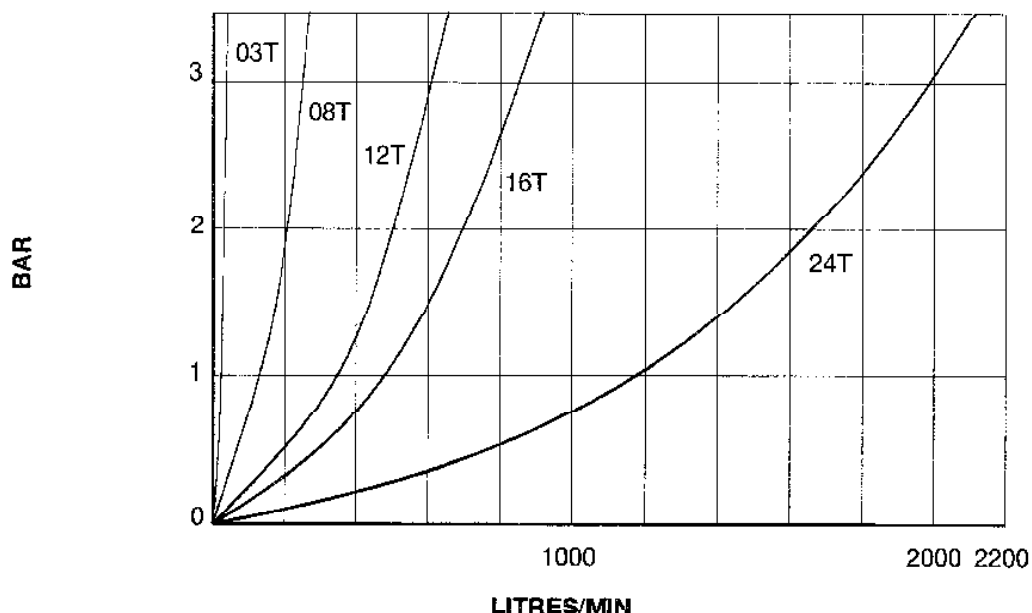
VDSHS03D-31B1ND\*\*NBBA1

Voltage and cap	**
110V AC with lamp and rectifier	AA
250V AC with lamp and rectifier	CA
24V DC with lamp	JL
96V DC with lamp	PL
198V DC with lamp	TL

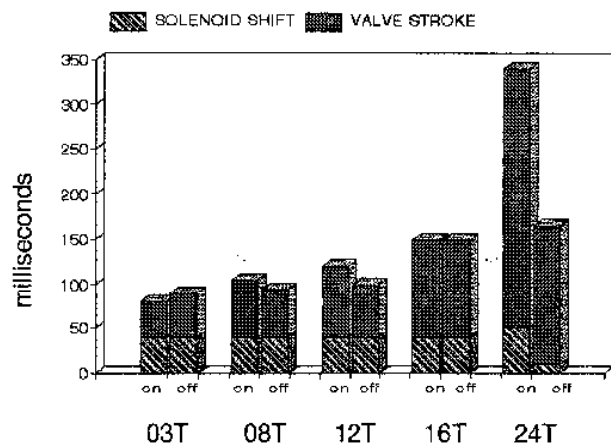
# **VB T - \*\* T O R E** **2 PORT SEATED BYPASS VALVES** **HOUSE STANDARD MANIFOLD MOUNTING** **480 BAR AND 1200 BAR RANGES** **PERFORMANCE DATA.**

All testing generally in accordance with BS4062 part 1

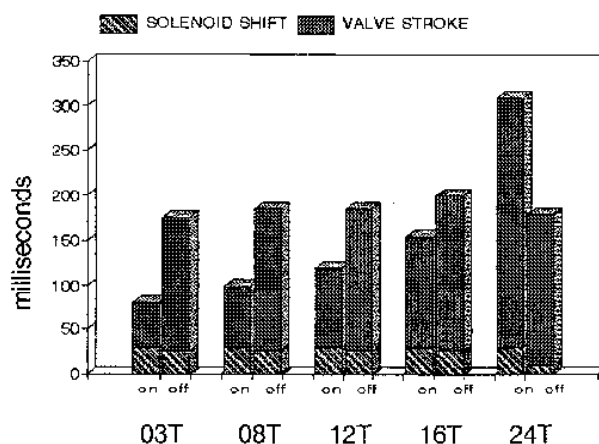
"Fluid" - mineral oil, 32 centistokes at 40°C and solenoid voltage nominal -10%, Pilot pressure 35 bar



## **NORMALLY CLOSED**



## **NORMALLY OPEN**



Volume of Pilot fluid required for full stroke (ml)	
06C	11,4
09C	13,7
10C	15,4
12C	25,1
13C	22,0

**Note:-** Switching times for "off" will increase substantially if diodes are used to prevent back emf voltage surges, or rectifiers are fitted in cap. Allow 100m/s for solenoid shift at switch off for all sizes except 24T. For 24T allow 60m/s. 24T valves include orifice in pilot stage port P to create controlled operating speed.

Pilot pressure (bar)	
Minimum	17
Recommended	35
Maximum	70

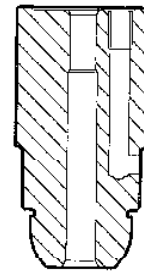
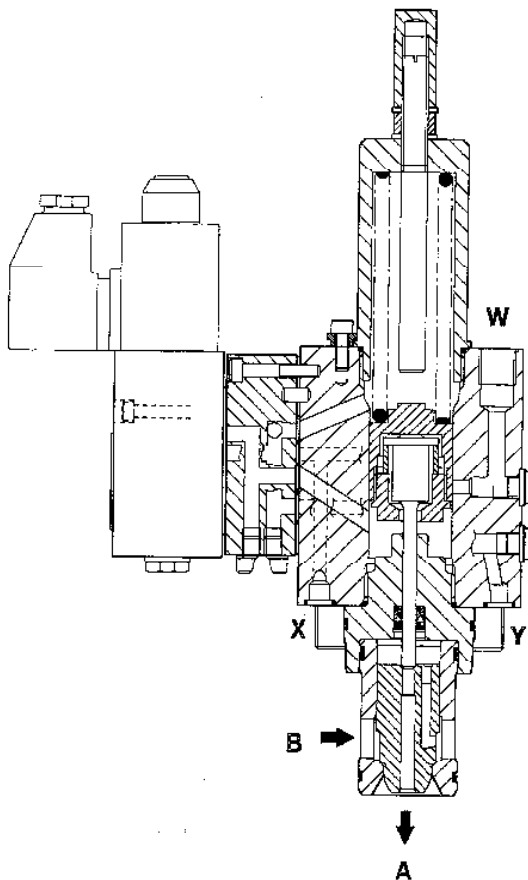
# **VBT - \*\* B** **2 PORT SEATED SWITCHING VALVES** **HIGH PRESSURE HOUSE STANDARD CARTRIDGE** **700 BAR.**

Due to design and stress limitations those valves based on the standard cartridge centres - ISO7368 are only capable of a safe working pressure of 500 bar.

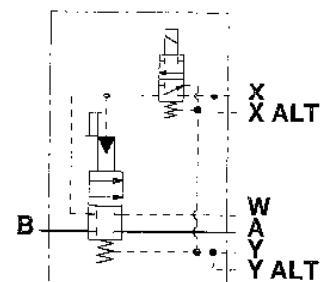
For working pressures higher than this Oilgear Towler have introduced a small range of valves capable of working at 700 bar. They are still based on ISO7368 but combine the cartridge bore element from one size with the bolt centres and drilling's from the size above.

This combination gives a safe unit for working at these higher pressures whilst still maintaining the flexibility of using various poppet designs from the standard range of VBT valves.

For economical reasons this particular range of valves has been limited to 3 sizes only.

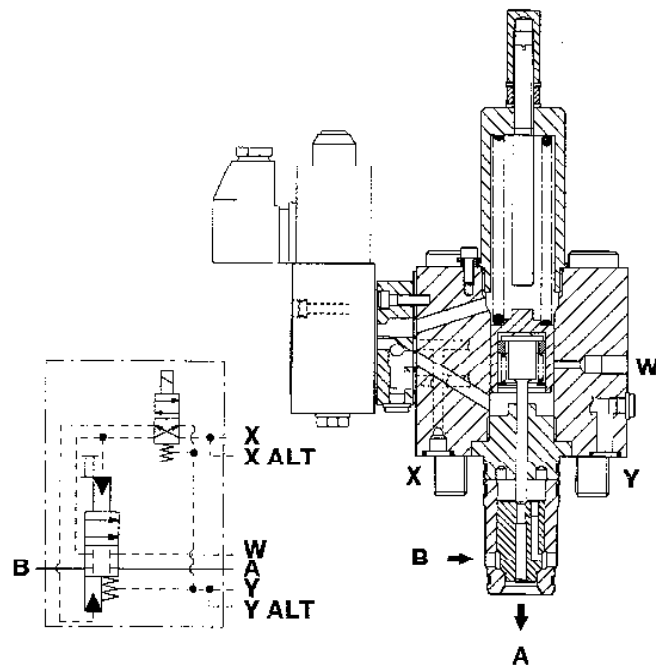


Spherical nose poppets designed specifically for individual requirements e.g. for controlled decompression.



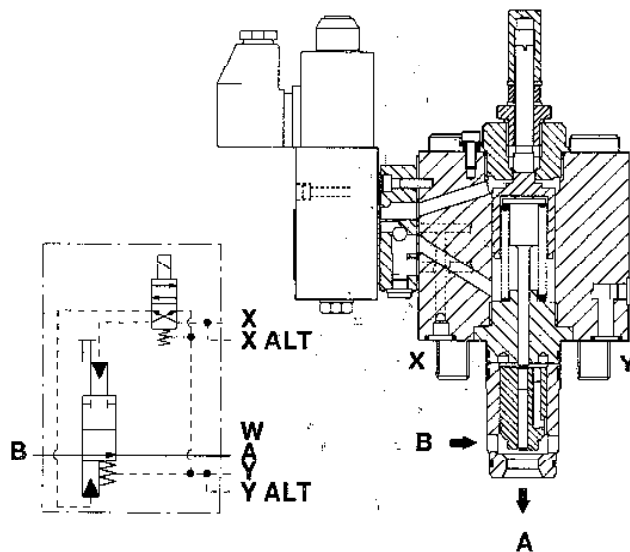
**NORMALLY OPEN SOLENOID PILOT OPERATED - 700 BAR**  
**VBTSE09B-70RHGABBA1 / VDSHS02H3-3JA1ND\*\*NBBA1**

**VB T - \*\* J OR JB**  
**2 PORT SEATED SWITCHING VALVES**  
**HIGH PRESSURE HOUSE STANDARD CARTRIDGE**  
**1400 BAR.**



**NORMALLY CLOSED SOLENOID PILOT OPERATED -1400 BAR**

**VBTSF08J-A4SHGABBA1/VDSHS03D-31B1ND\*\*NBBA1**



**NORMALLY OPEN SOLENOID PILOT OPERATED - 1400 BAR**

**VB TSA08J-A4SHBABBA1/VDSHS03D-31B1ND\*\*NBBA1**

## **VBT - \*\* J OR JB**

### **2 PORT SEATED SWITCHING VALVES**

### **HIGH PRESSURE HOUSE STANDARD CARTRIDGE**

**1400 BAR.**

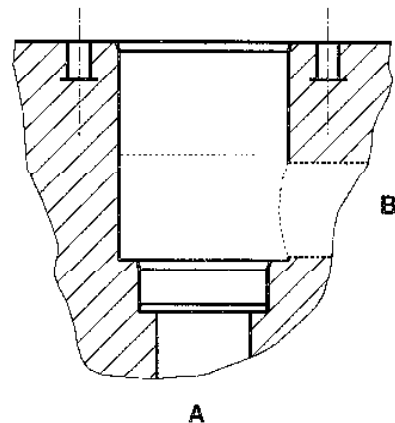
This form of VBT valve is used to control hydraulic systems with working pressures in the region of 1400 bar.

Although valves work at this pressure, they still conform to the design principles of the 2 port bypass valves in that the nominal pilot pressure required to operate is only 35 bar.

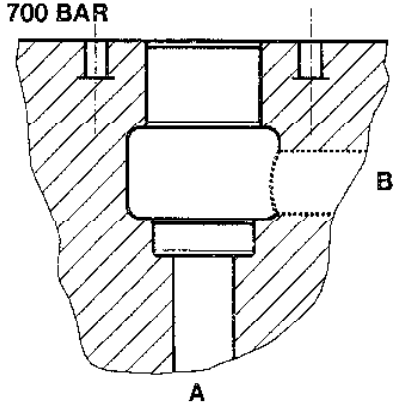
The mounting pattern is based on ISO7368 and contains elements of various sizes of valves combined together to give this particular high pressure range.

Due to the physical properties of the materials used the maximum size available is equivalent to a size 10 (N.G 40) giving a nominal flow capacity of 400 l/min at 3.5 bar.

#### **CAVITY FOR UPTO 700 BAR**



#### **CAVITY FOR OVER 700 BAR**



# VBT - \*\* B, J OR JB

## 2 PORT SEATED SWITCHING VALVES

### HIGH PRESSURE HOUSE STANDARD CARTRIDGE

1400 BAR

HOW TO ORDER.

Block Number Explanation	1	2	3	4	5	6	7		8	9	10	11	12	13	14	15
Valve Example	V	B	T	*	*	**	*	—	**	*	H	*	*	*	*	A1

#### 1 UNIT

**V** Valve

#### 2 BASIC FORM

**B** 2 port seated bypass

#### 3 VALVE TYPE

**T** 2 position standard

#### 4 CONTROL (see page 35)

**P** Pilot

**C** Pilot with reset choke

**S** Solenoid/elec pilot

#### 5 CONSTRUCTION

**A** 2 stage normally open

**D** 2 stage normally closed pilot both ways

**E** 2 stage normally closed phased sequence

**F** As "E" with pilot both ways

**K** 1 stage normally open

**L** 1 stage normally closed

**M** 1 stage normally closed phased sequence

#### 6 NOM SIZE

**SLIP IN CARTRIDGE**

**06** (Direct only) 16mm

**08** 25mm

**09** 32mm

#### 7 MOUNTING PATTERN

**B** Slip in cartridge at 700 Bar

**J** Slip in cartridge at 1400 Bar

**JB** Slip in cartridge at 1000 Bar

#### 8 MAX WORKING PRESSURE

**70** 700 Bar

**A0** 1000 Bar

**A4** 1400 Bar

#### 9 POPPET SHAPE (2 STAGE VALVES)

**S** Standard + Cushion (Oil)

**R** Spherical nose (Oil)

**Y** Special shape

#### POPPET SHAPE (SINGLE STAGE VALVES)

**E** Ø6,35 Seat, 90° Point

#### 10 SPRINGS

**H** Standard

#### 11 PILOT CONNECTIONS (see page 35)

**B** X and Y Line and Manifold option

**G** X and Y Line - Manifold option - Pilot sequence - N/C valves

#### 12 TOP CAP ASSEMBLY

**N** Standard - No adjustment

**A** With opening adjustment

#### 13 DIMENSIONS

**B** Metric with BSP Port threads

#### 14 SEALS

**B** Buna N

**V** Viton

**E** E.P.D.M

**Z** Special

#### 15 DESIGN SERIES

**A1** Assigned by factory

/ Pilot valve required and / or extras

**PILOT VALVE SAME AS OTHER VALVES OF SIMILAR TYPE**



# **VB★** **MANIFOLD CONVERSION BLOCKS** **TO CONVERT CARTRIDGE MOUNTING ISO 7368** **TO MANIFOLD MOUNTING.**

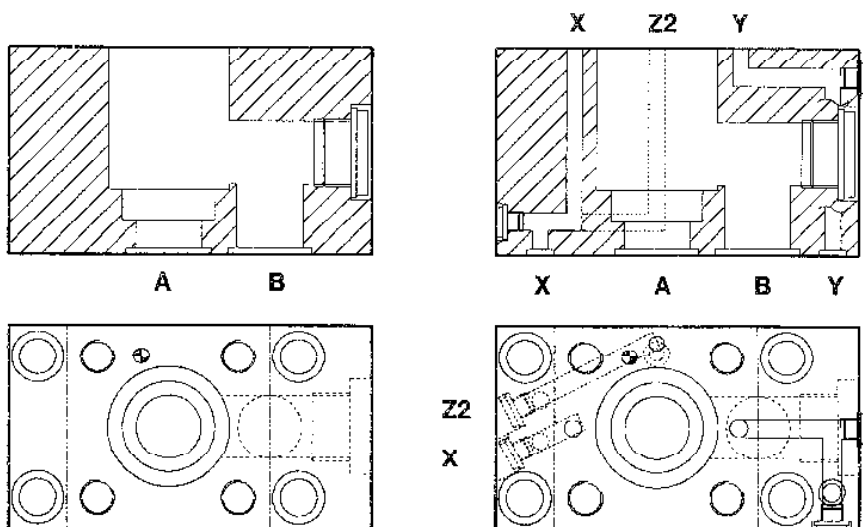
These blocks are used to convert standard cartridge valves of ISO7368 form into non-standard manifold mounting versions.

They are intended for use at higher pressures than are allowed by the standard manifold centres of ISO5781.

Oilgear Towler have produced these blocks with a view to easier manufacture of the mating manifold if boring facilities are limited. The precise machining of cartridge bores is no longer required so the manifold is simply a drilled component but with good surface finishes on mating faces.

All inter connecting drilling's are done in the conversion block and each port sealed using square section joint rings to minimise leakage. Pilot and drain ports are spaced at one end of the block for ease of drilling in main manifold. These blocks are only available for cartridge valves to ISO7368 and up to and including size 10 (NG40).

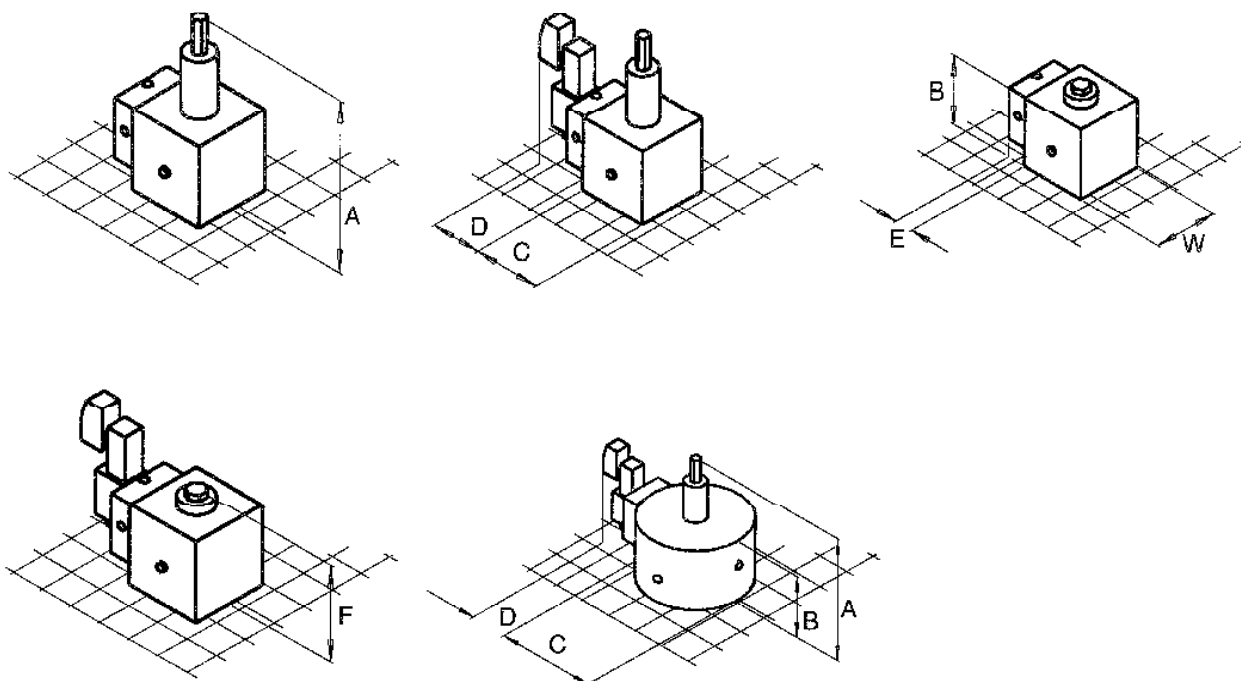
Oilgear Towler do not recommend the using of surface mounted valves for high pressures in sizes over 63mm.



# GENERAL DIMENSIONAL DATA

## VBT - CARTRIDGE.

### SLIP-IN CARTRIDGE VALVES VBT



	A	B	C	D	E	F	W
06C	257	106	89	142,5	42,5	146	63,5
09C	268,5	117,5	102	134	44	144,5	102
10C	286	135	127	134	44	162	127
12C	279	128	180	134	44	155	180
13C	301	150	245	134	44	178	Ø250
13CA	301	150	245	134	44	178	Ø250
08J	270	118	127	136,5	44	135	127
09B	268,5	117,5	127	134	44	144,5	127

DIM TAB1 7/8/93

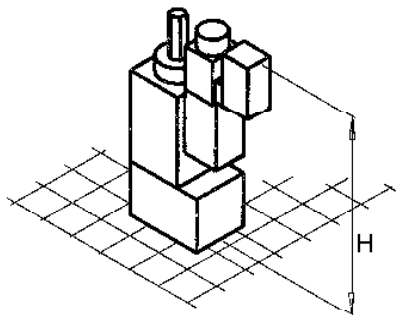
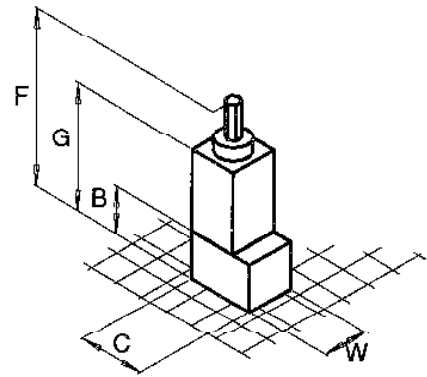
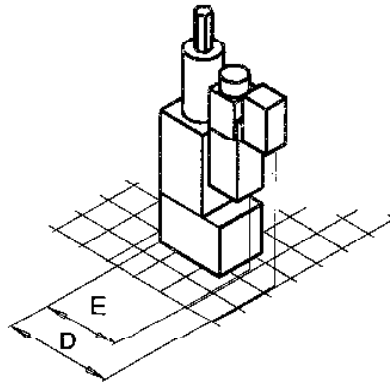
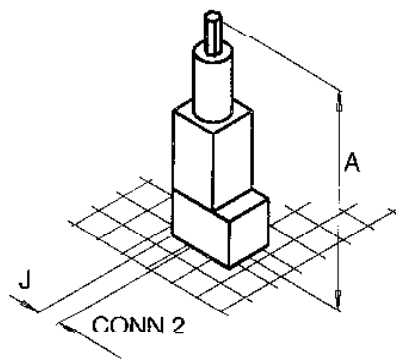
THESE DIMENSIONS ARE APPROXIMATE ONLY. CONSULT RELEVANT DATA.

# GENERAL DIMENSIONAL DATA

VBT - MANIFOLD

VBW - MANIFOLD.

## HIGH PRESSURE MANIFOLD VALVES - VBT



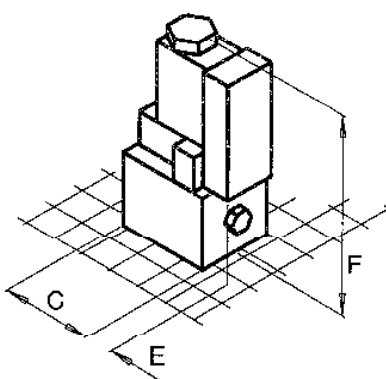
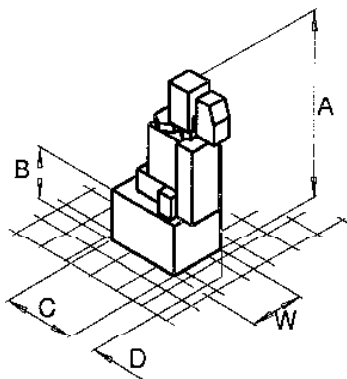
★

	A	B	C	D	E	F	G	H	J	W
03T	287	38	76	208	157	239	168	362	38	76
04T	287	38	76	208	157	239	168	262	38	76
08T	331	76	115	208	157	277	206	400	38	76
12T	401	146	156	237	181	347	276	470	62	111
16T	430,3	175	187	240	189	376	305	499	70	120
24T	477,3	222	230	246	195	423	352	546	76	190
03E	287	38	76	208	157	239	168	362	38	76
08E	538	82,5	119	240	189	283,5	212,5	406,5	54	108
12E	420,3	165	165	230	179	366	295	400	60	140

DIM TAB2 7/8/93

★ Add 25mm to all heights for valves with check and / or separate fluids

## MANIFOLD VALVES FOR HWBF - VBW

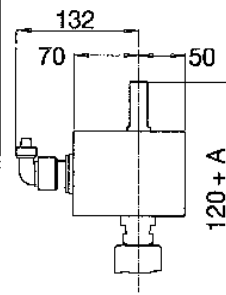


	A	B	C	D	E	F	W
06P	333	88	110	54	20	243	90
08P	345	99	138	54	18	254	102
10P	402	156	150	52,5	17,5	311	127

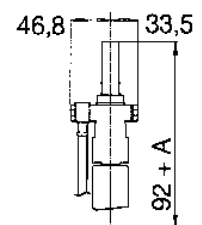
DIM TAB3 7/8/93

## EXTRAS ALL TYPES

Switches for N/C Valves

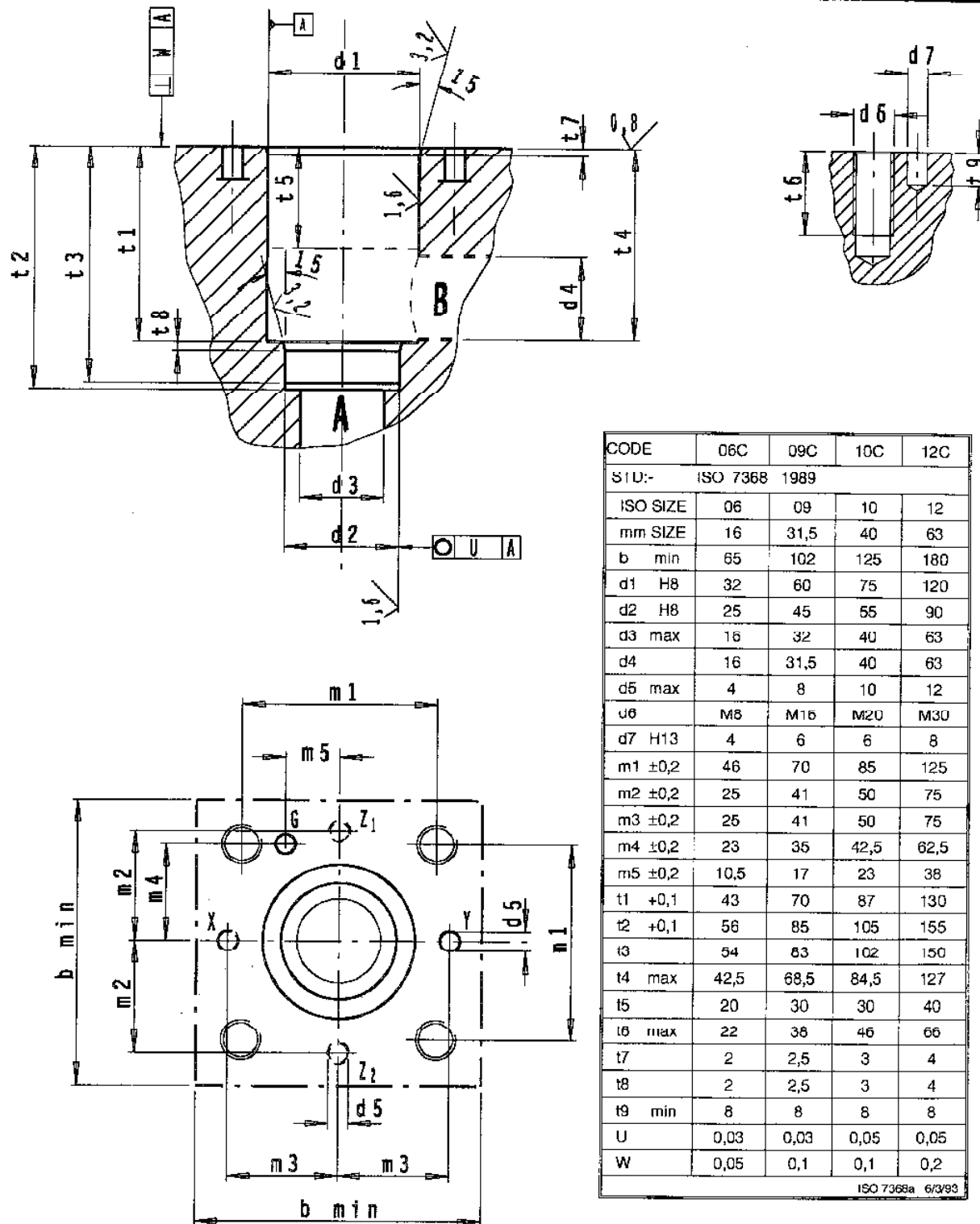


Decompression for N/C Valves

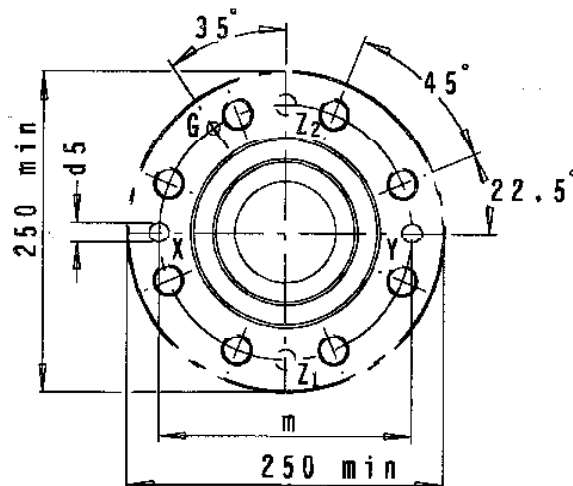
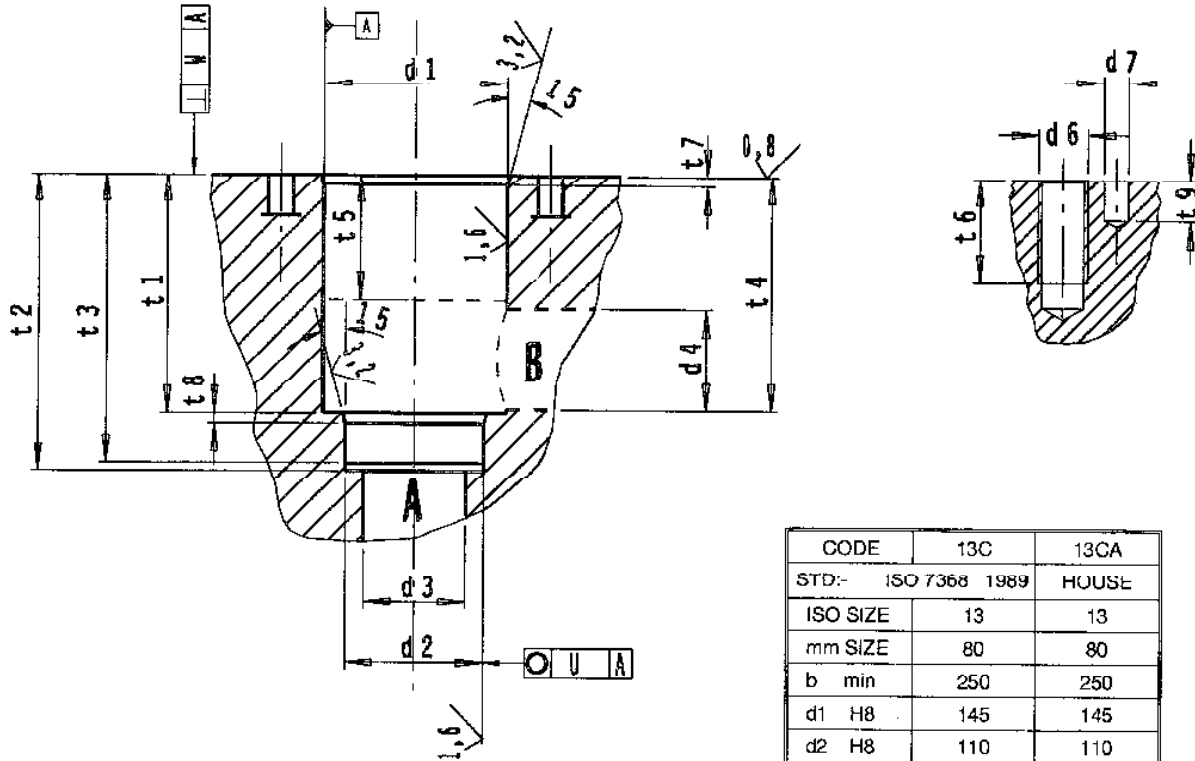


THESE DIMENSIONS ARE APPROXIMATE ONLY. CONSULT RELEVANT DATA.

**MOUNTING PATTERN**  
**2 PORT SEATED BYPASS VALVES**  
**CARTRIDGE MOUNTING TO ISO7368**  
**500 BAR**  
**FOR VBT - 06C TO 12C.**



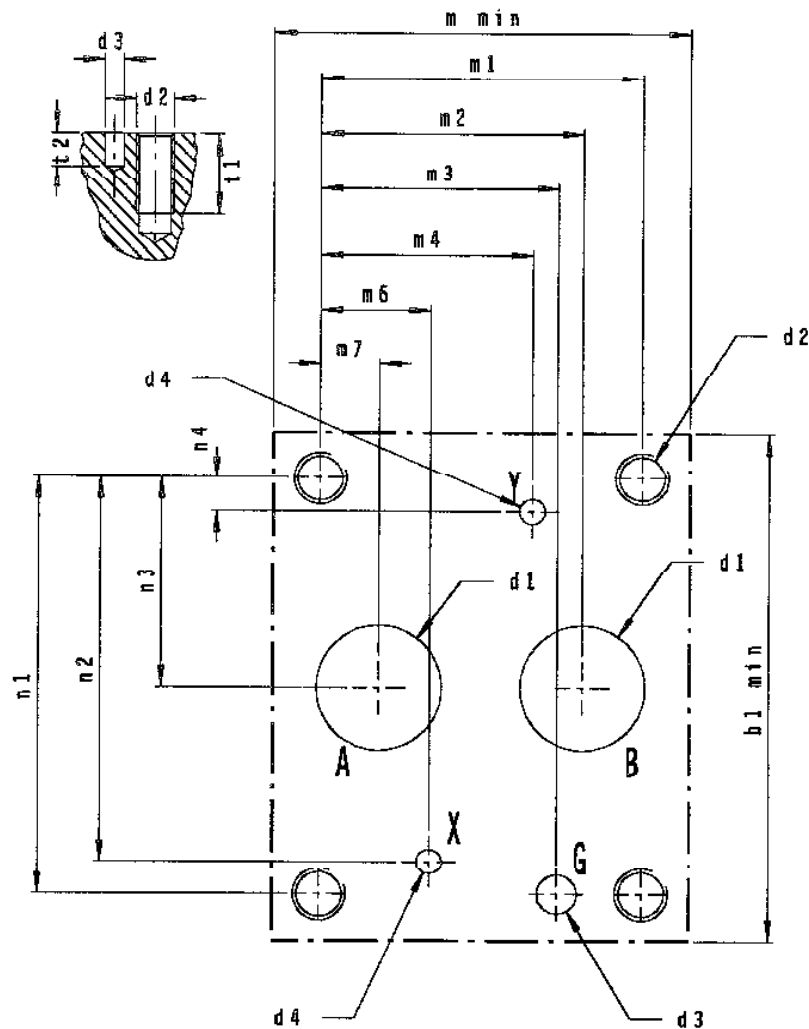
**MOUNTING PATTERN**  
**2 PORT SEATED BYPASS VALVES**  
**CARTRIDGE MOUNTING TO ISO7368**  
**500 BAR**  
**FOR VBT - 13C OR 13CA.**



CODE	13C	13CA
STD:-	ISO 7368 1989	HOUSE
ISO SIZE	13	13
mm SIZE	80	80
b min	250	250
d1 H8	145	145
d2 H8	110	110
d3 max	80	80
d4	80	80
d5 max	16	16
d6	M24	M30
d7 H13	10	10
m ±0,2	200	200
t1 +0,2	175	175
t2 +0,2	205	205
t3	200	200
t4 max	170,5	170,5
t5	40	40
t6 max	54	54
t7	5	5
t8	5	5
t9 min	8	8
U	0,05	0,05
W	0,2	0,2

ISO7368c 6/3/93

**MOUNTING PATTERN**  
**2 PORT SEATED BYPASS VALVES**  
**MANIFOLD MOUNTING TO ISO5781**  
**310 BAR**  
**FOR VBW - \*\* P.**



CODE / SIZE			STD:- ISO 5781 1987																		
O / T	ISO	mm	b min	d1 max	d2	d3	d4	m min	m1 ±0,1	m2 ±0,2	m3 ±0,1	m4 ±0,2	m5 ±0,1	m6 ±0,2	m7 ±0,2	n1 ±0,1	n2 ±0,2	n3 ±0,2	n4 ±0,2	t1	t2 min
06P	06	16	84	14,7	M10	7,5	4,8	61	42,9	35,7	31,8	21,4	—	21,4	7,1	66,7	58,7	33,3	7,9	26	8
08P	08	25	97	23,4	M10	7,5	4,8	78	60,3	49,2	44,5	39,7	—	20,8	11,1	79,4	73	39,7	6,4	26	8
10P	10	32	114	32	M10	7,5	4,8	102	84,1	67,5	62,7	59,6	42,1	24,6	16,7	96,8	92,9	48,4	4	26	8

ISO7581 6/3/81

ISO7581 6/3/83

# MOUNTING PATTERN

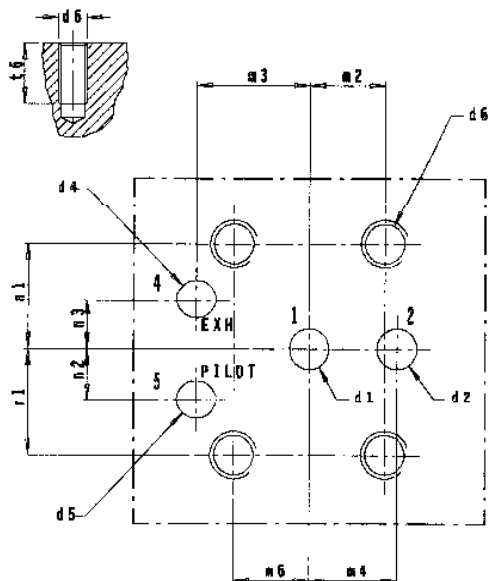
2 PORT SEATED BYPASS VALVES

HOUSE STANDARD MANIFOLD MOUNTING

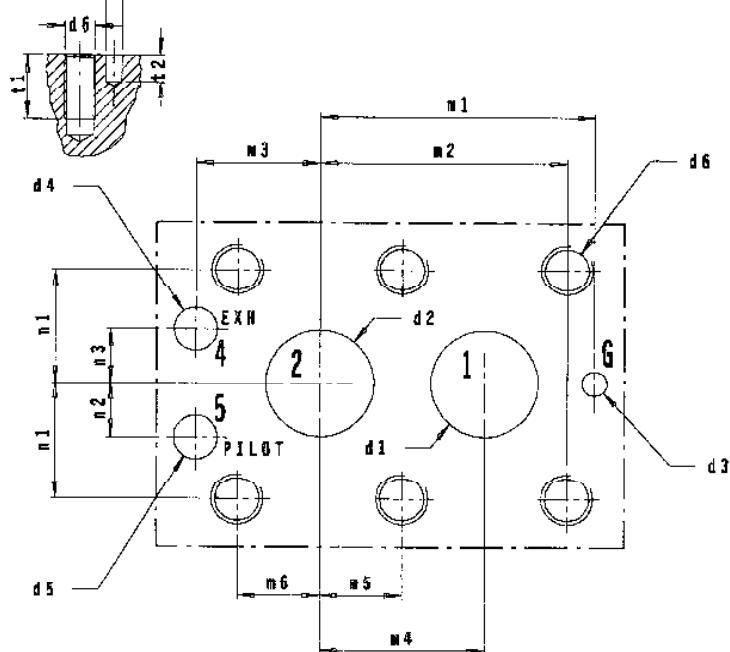
480 - 1400 BAR

FOR VBT - \*\* T OR E.

SIZE 03 AND 04



SIZE 08, 12, 16 AND 24



Sizes 031, 04T and 04E Part designations 2&1 are 1&2

CODE / SIZE		W, P (BAR) max	STD:- HOUSE BY***																		
O / T	mm		d1	d2	d3	d4	d5	d6	m1 ±0,1	m2 ±0,1	m3 ±0,2	m4 ±0,2	m5 ±0,1	m6 ±0,1	n1 ±0,1	n2 ±0,2	n3 ±0,2	t1 max	t2 min		
03T	10	480	10	10	—	10	10	M12	—	—	28,6	22,2	19,1	19,1	27	12,7	12,7	18	—		
04T	12	480	10	10	—	10	10	M12	—	—	28,6	22,2	19,1	19,1	27	12,7	12,7	18	—		
08T	25	480	25	25	6	10	10	M12	63,5	57,2	28,6	38,1	19	19	27	12,7	12,7	20	6		
12T	40	480	35	35	—	10	10	M16	—	79,4	44,5	50,8	34,9	34,9	41,3	20,6	0	22	—		
16T	50	480	45	45	6	12	12	M20	108	95,3	50,8	63,5	31,8	31,8	46	20,6	0	26	6		
24T	75	480	63	63	—	12	12	M30	—	123,8	60,3	85,7	47,6	47,6	69,9	20,6	20,6	35	—		
03E	10	1380	10	10	—	10	10	M12	—	—	28,6	22,2	19,1	19,1	27	12,7	12,7	18	—		
08E	25	1240	25	25	6	10	10	M20	63,5	57,2	34,9	38,1	19,1	19,1	33,3	12,7	12,7	26	6		
12E	40	1000	35	35	—	12	10	M16	—	79,4	44,5	50,8	34,9	34,9	41,3	20,6	0	22	—		
16E	50	1380	45	40	—	—	—	M38	—	130,2	—	92,1	54	54	76,2	—	—	50	—		

BY T 83/93

BY\_T 8/3/93

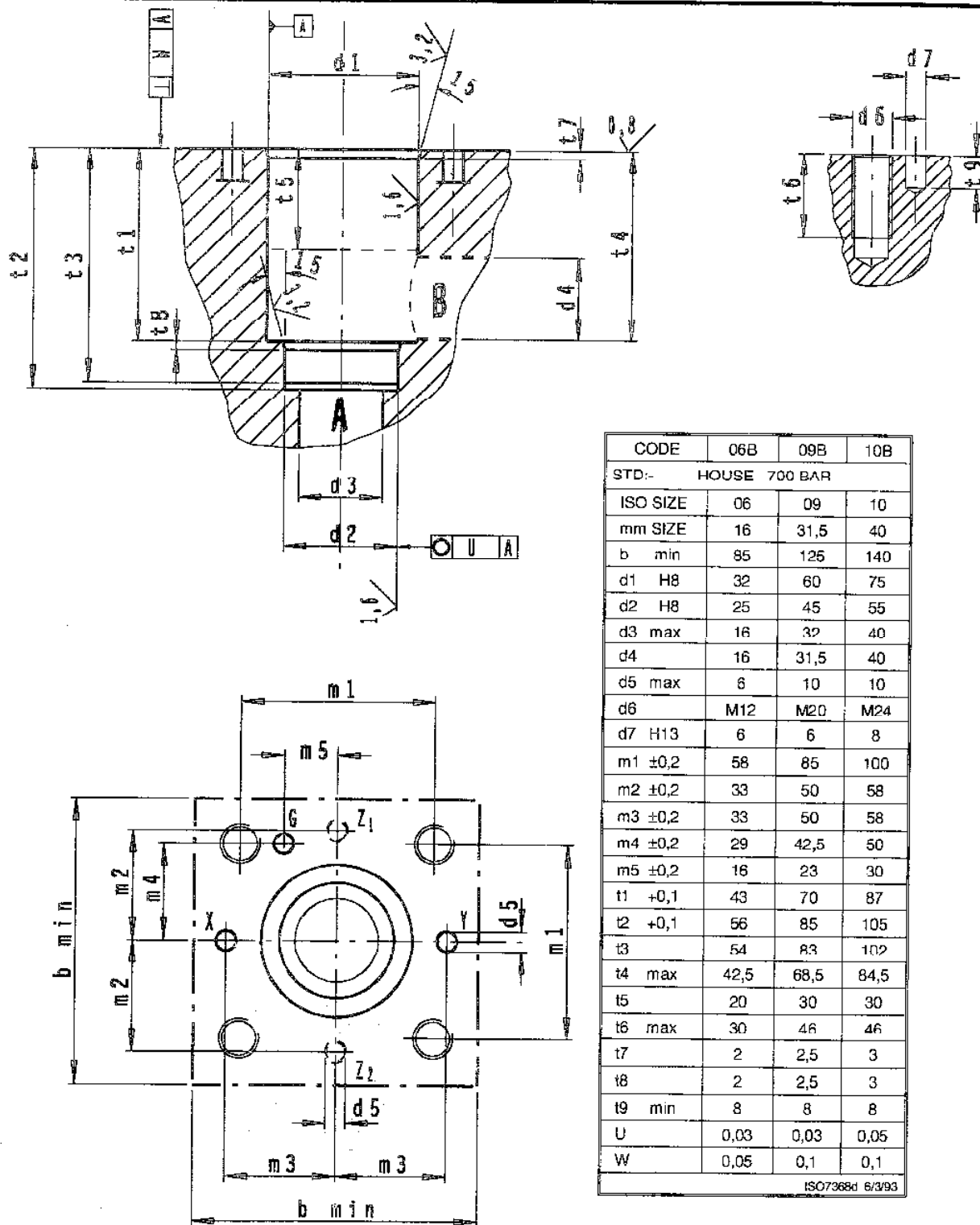
# MOUNTING PATTERN

2 PORT SEATED BYPASS VALVES

HOUSE STANDARD CARTRIDGE MOUNTING

700 BAR

FOR VBT - ★★ B.





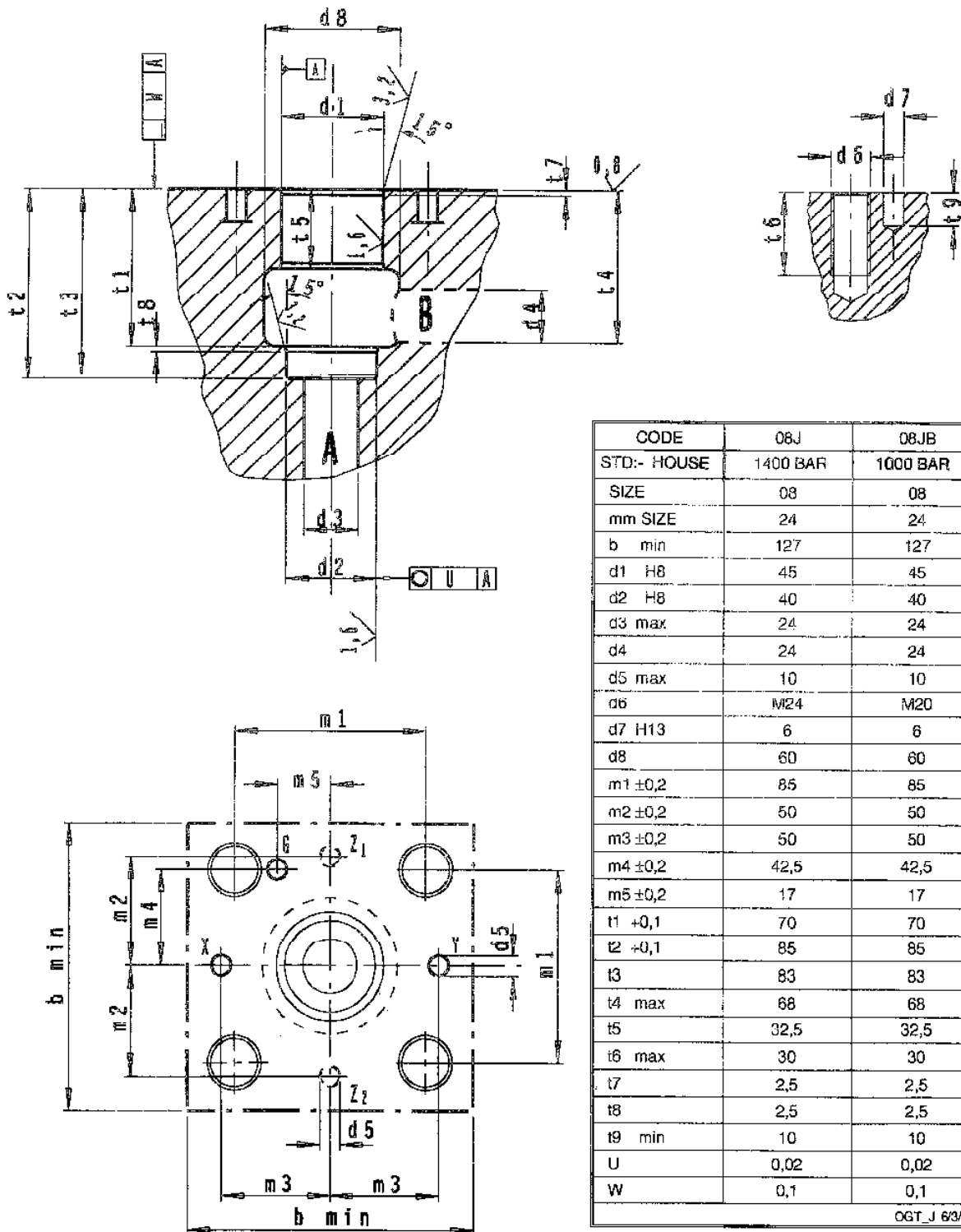
# MOUNTING PATTERN

2 PORT SEATED BYPASS VALVES

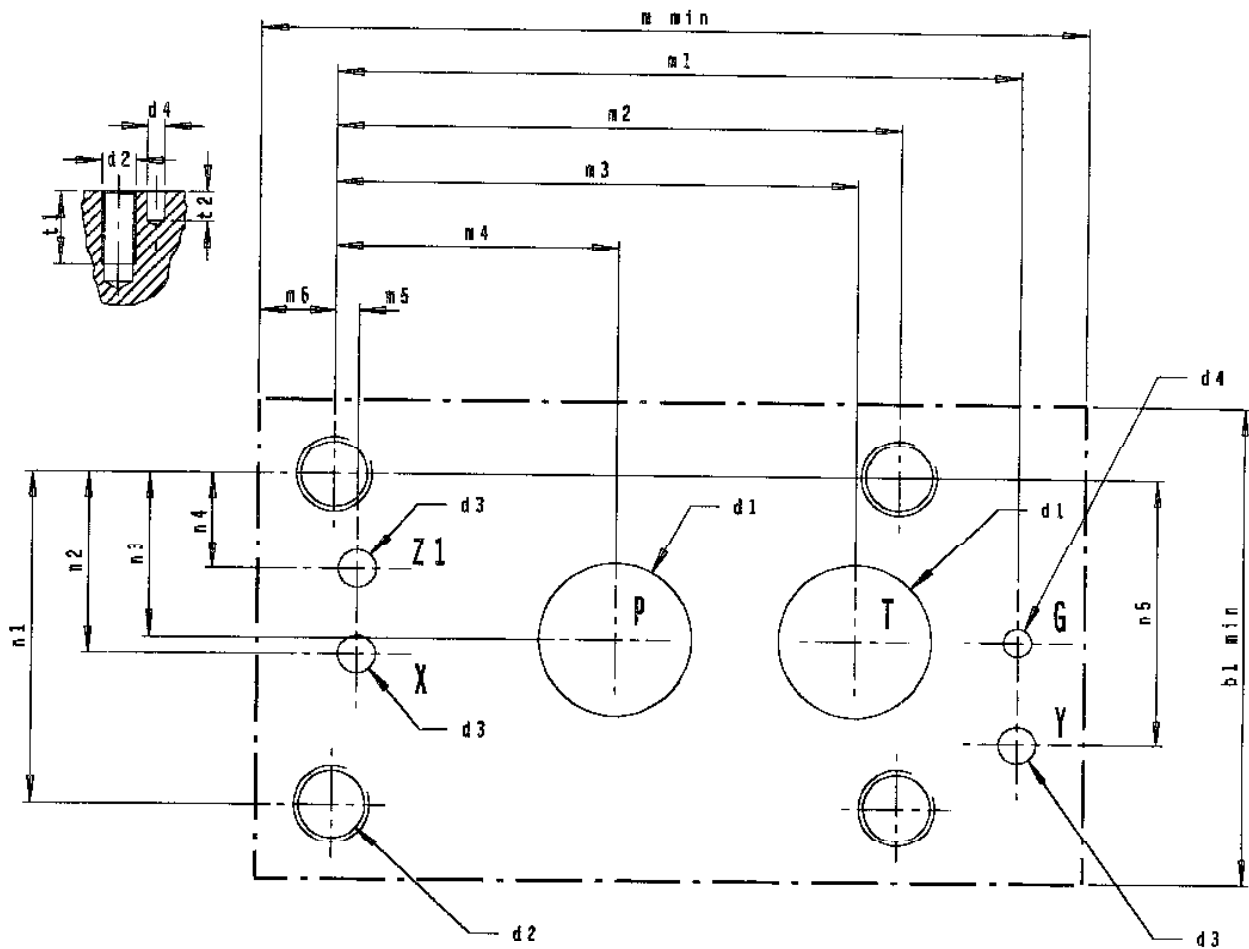
HOUSE STANDARD CARTRIDGE MOUNTING

1400 BAR

FOR VBT - \*\* J OR JB.



# MOUNTING PATTERN 2 PORT SEATED BYPASS VALVES MANIFOLD CONVERSION BLOCKS 500 BAR.



CODE / SIZE			CONVERSION BLOCKS																		
O / T	ISO	mm	b1 min	d1 max.	d2	d3	d4	m min	m1 ±0,1	m2 ±0,2	m3 ±0,1	m4 ±0,2	m5 ±0,2	m6 ±0,2	n1 ±0,1	n2 ±0,2	n3 ±0,2	n4 ±0,2	n5 ±0,2	t1	t2 min
06	06	16	65	16	M8	5	6	115	93	78	69	39	2	11	46	26	23	11	36,5	12	8
09	09	31,5	101,6	32	M16	8	6	170	140	118	109	59	5	16	70	38,5	35	20,5	56,5	24	8
10	10	40	127	40	M20	10	6	228	188	166	146	83	8	18	85	49	42,5	26	75	30	8

OGT\_CNVR 5/5/93

## DEFINITIONS FROM ORDER CODE.

Each block number represents a particular feature of this valve range. Some parts may not be clear for general use from the short description given in the "HOW TO ORDER" codes on pages 10, 11, 14, 18, 19 and 20.

### 4. CONTROLS.

#### **C** PILOT WITH RESET CHOKE

This style has an orifice fitted which forms a permanent bleed off the pilot supply such that when pilot supply is closed off the valve will reset to its normal position, pilot piston fluid being expelled through the orifice to tank.

#### **F & H** SEPARATE FLUIDS

Separate fluids is a design to allow different fluids in pilot and main stage. e.g. Oil for pilot, Water for main.

### 5. CONSTRUCTION.

#### **E, F, G, H, M**, PHASED SEQUENCE

This is a design feature where pilot fluid can be passed out of the valve to operate further valves. Fluid will only pass when the pilot piston lifts far enough to expose the sequence port ensuring that the "Sequence" is only operative after valve movement.

#### **R & S** BUILT-IN SEQUENCE

Built-in sequence is simply a port to connect pilot fluid to other valves, but is taken directly from switched pilot. Pilot Fluid can flow prior to main stage operating.

### 11 PILOT CONNECTIONS.

code	X	Y	X Line	Y Line	W Line	Internal Drain	Phased	Not Phased
B	✓	✓	✓	✓	—	—	—	—
E	✓	✓	✓	✓	✓	—	—	✓
G	✓	✓	✓	✓	✓	—	✓	—
K	✓	—	✓	—	—	✓	—	—

# Oilgear Towler

**VBT. VBW.**

**2 PORT SEATED BYPASS VALVES.**

**The Oilgear Company**

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