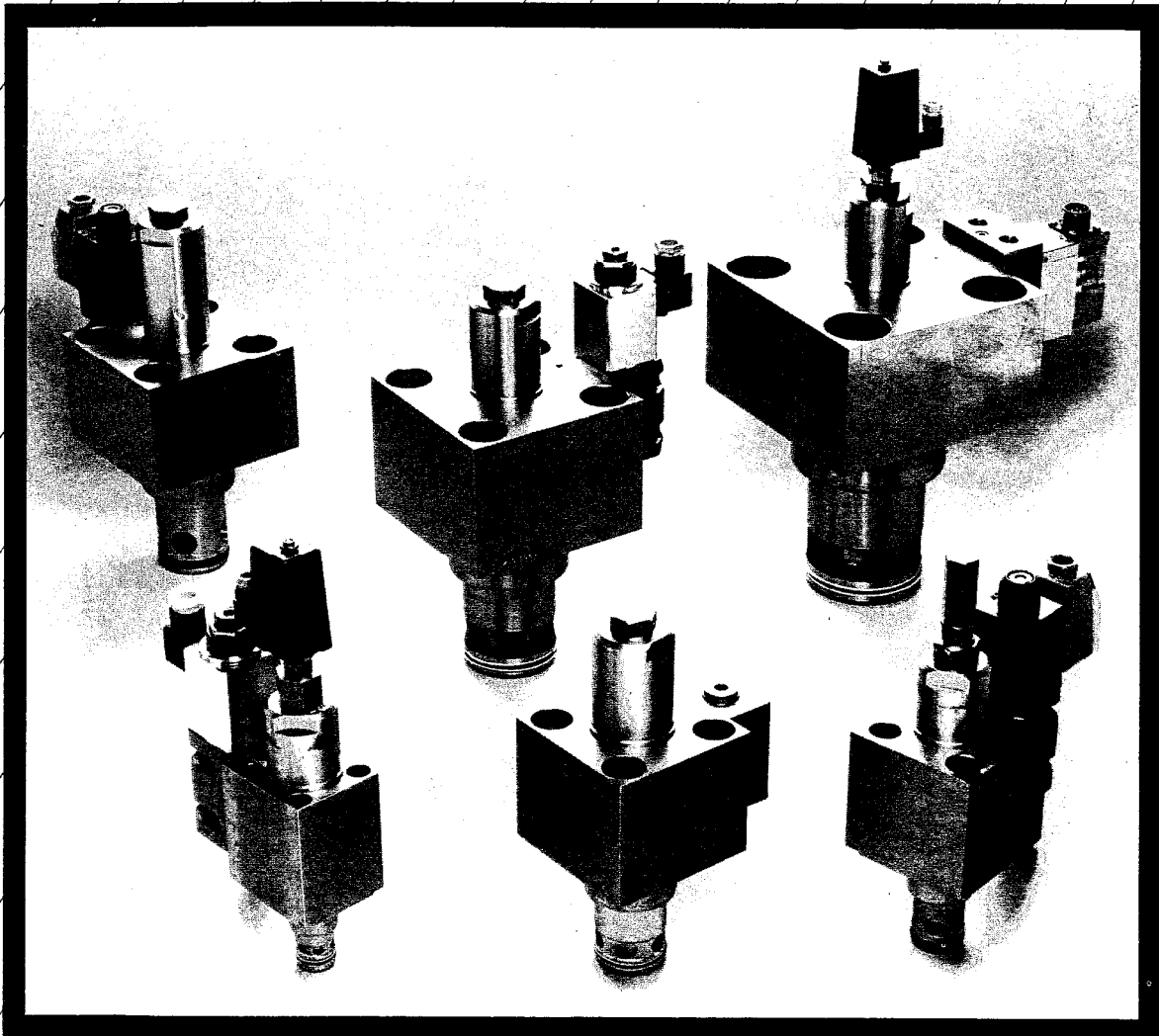


Oilgear Towler

VBT. VBW.
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.



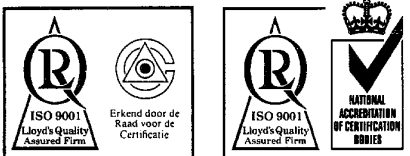
You the customer and user of the equipment, have a vital role to play in ensuring that components and systems are installed, operated and maintained in accordance with our recommendations. By doing this you will help us to achieve Performance Assurance, to our mutual benefit.

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.

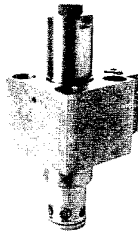
You are strongly recommended to check with Oilgear Towler that you have up-to-date information when designing with, specifying or purchasing equipment.

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



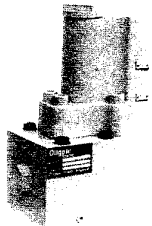
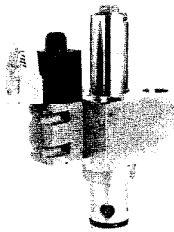
2 PORT SEATED BYPASS VALVES

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.

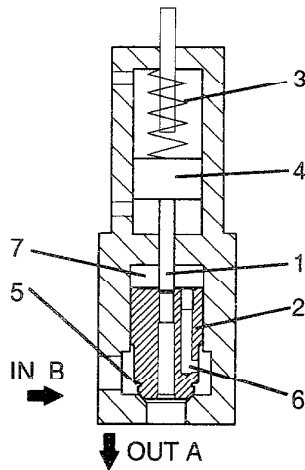
PRINCIPLE OF OPERATION

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

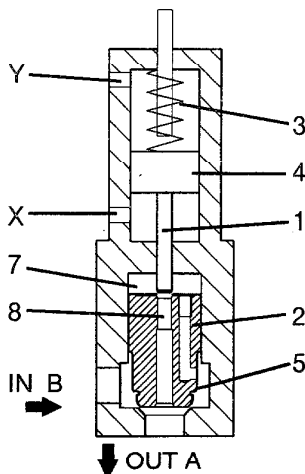
(Pilot Connection to Exhaust).



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).

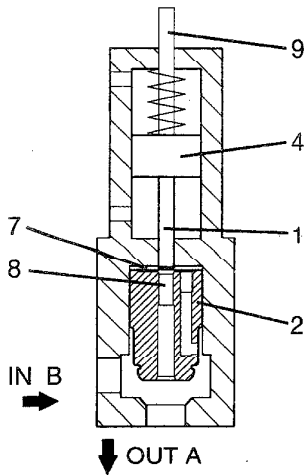


To open the valve, low pressure pilot supply (X) is directed to the under-side of the Pilot Piston (4) forcing it upwards against the loading of the Spring (3). This action lifts the lower end of the Pilot Rod (1) off its seat in the top of the Main Poppet (2), allowing the pressurised fluid in the Top 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

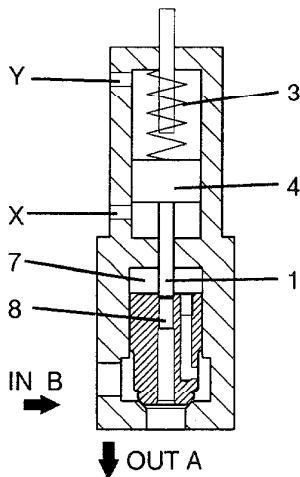
(Pilot Supply to Pilot Connection).



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.

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.

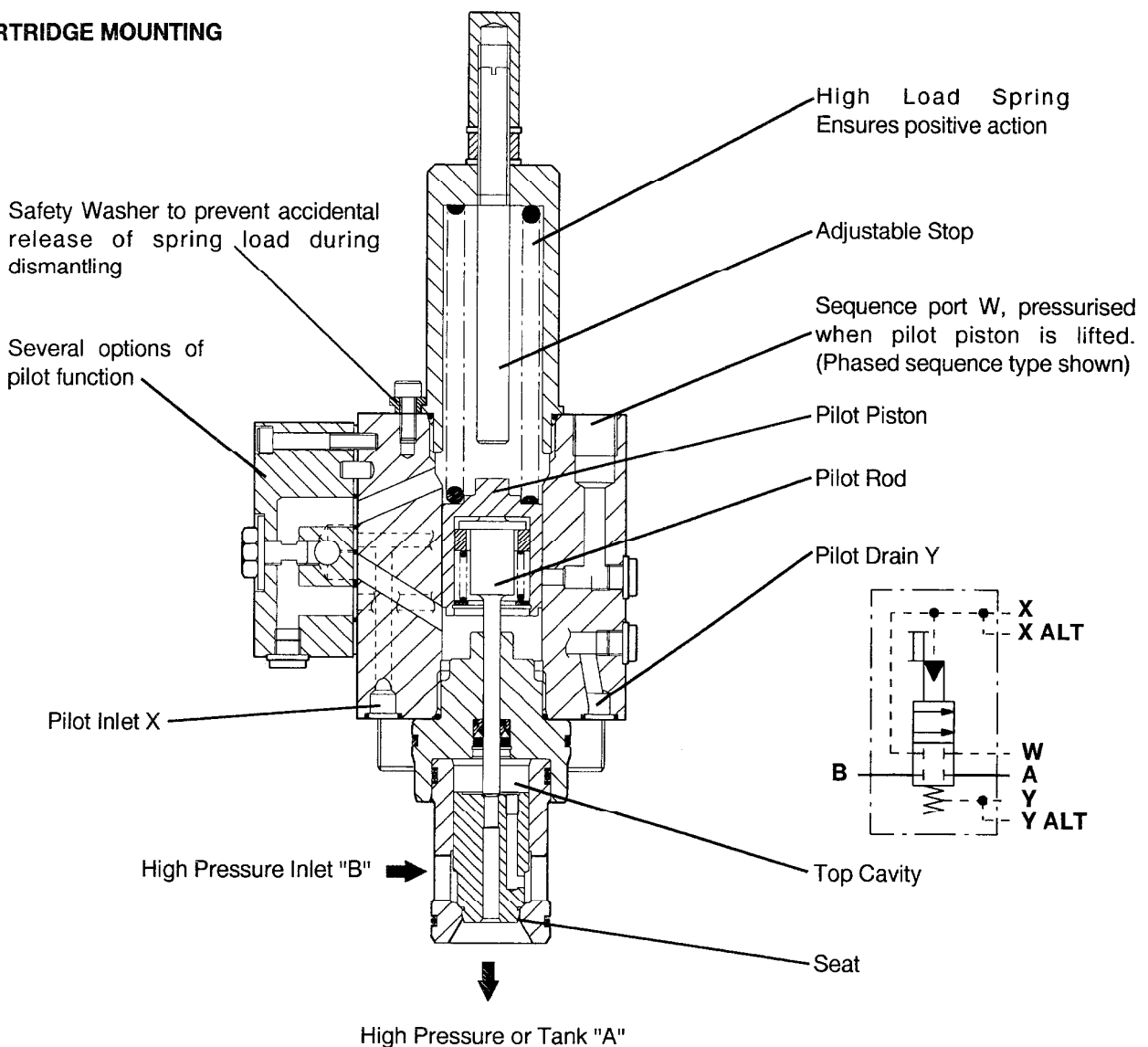
8. Materials.

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

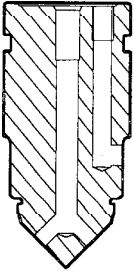


Valves detailed in this bulletin are :- **VB**T (Cartridge and Manifold) mounting for oil and **VB**W (Manifold mounting for HWBF fluids) 2 port, 2 position valves.

Other valves in this category are :- **V**BD (Descaling valve), **V**BF (Forge valve - especially for forging press systems), **V**BP (Proportional valves) and **V**BS (Servo operated valves).

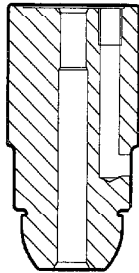
2 PORT SEATED BYPASS VALVES SUPPLEMENTARY FEATURES.

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



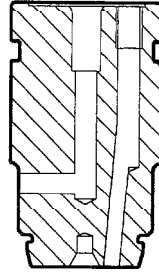
Cone pointed poppet specially developed for 95/5 systems.

CODE P



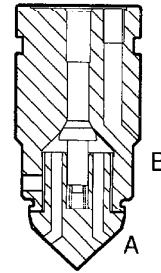
Spherical nose poppets designed specifically for individual requirements e.g. for controlled decompression.

CODE R for std. shape
CODE Y special shape



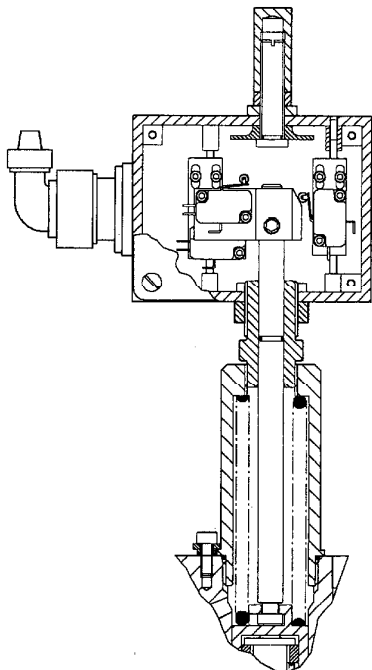
Reverse flow poppets only for special use. Consult Oilgear Towler Leeds. This style is not suitable for all applications.

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



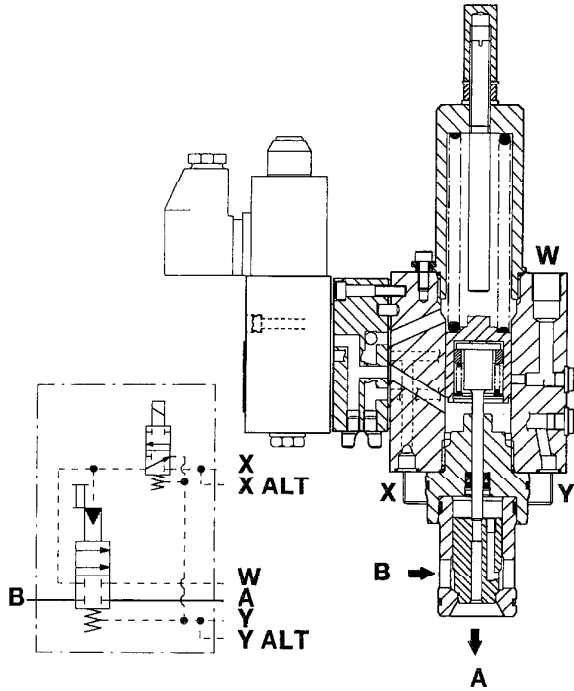
To ensure that a machine is safe and in a fully interlocked condition, there is available a simple attachment that replaces the standard top closure and it comprises, 3 switches one of which is a fully safe type and indicates safe closed position, the others indicate closed and maximum opening positions.

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

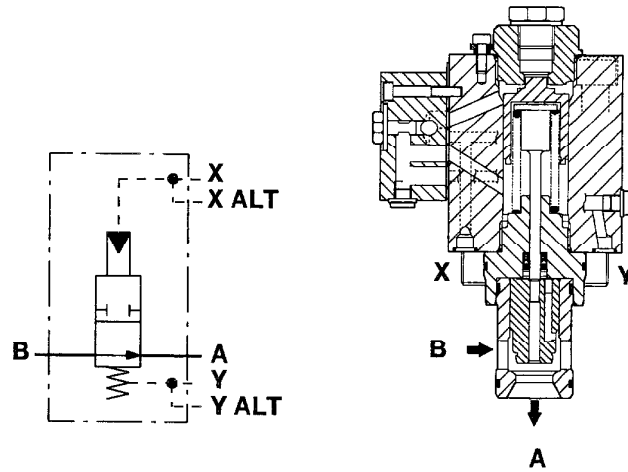
CODE F as shown

CODE M Induction position switch

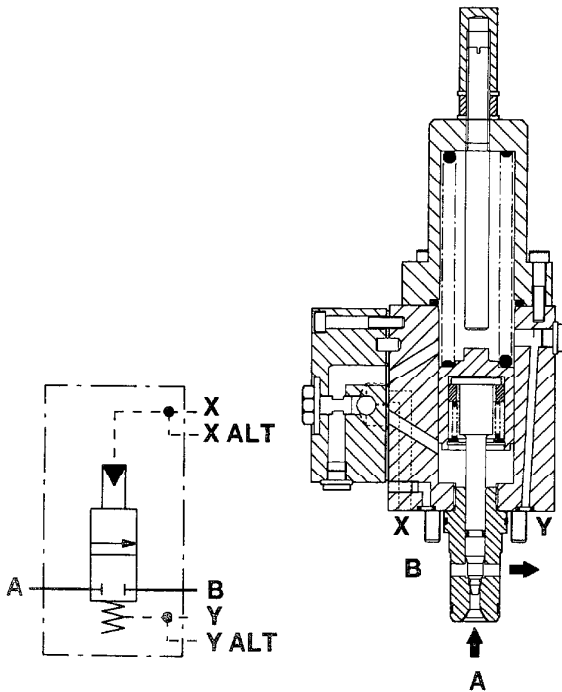
VBT - *C**
2 PORT SEATED BYPASS VALVES.
SLIP IN CARTRIDGE TO ISO7368.



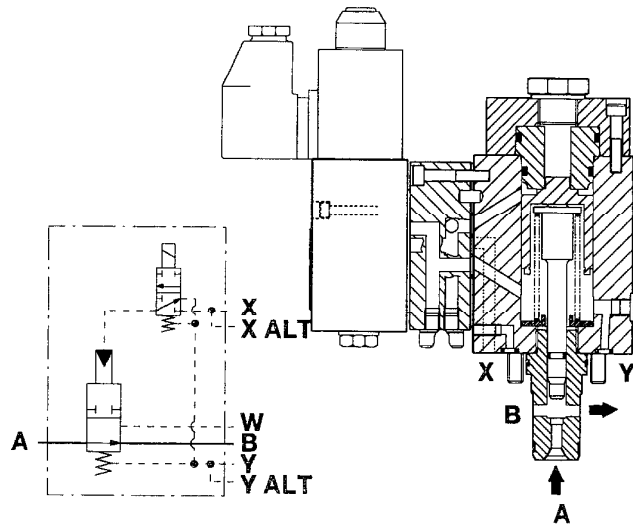
2 Stage Normally closed solenoid pilot operated.
VBTSE09C-50SHGABBA1 / 229132C / VDSHS02
H3-3JA1NDNBBA1**



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
JA1NDNBBA1**

VBT - **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 | 50 | 500 |
| 09C | 50 | 500 |
| 10C | 50 | 500 |
| 12C | 50 | 500 |
| 13C | 45 | 450 |
| 13CA | 50 | 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 Ø3,17 seat, flat end

10 SPRINGS

H Standard

VBT - **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 :-

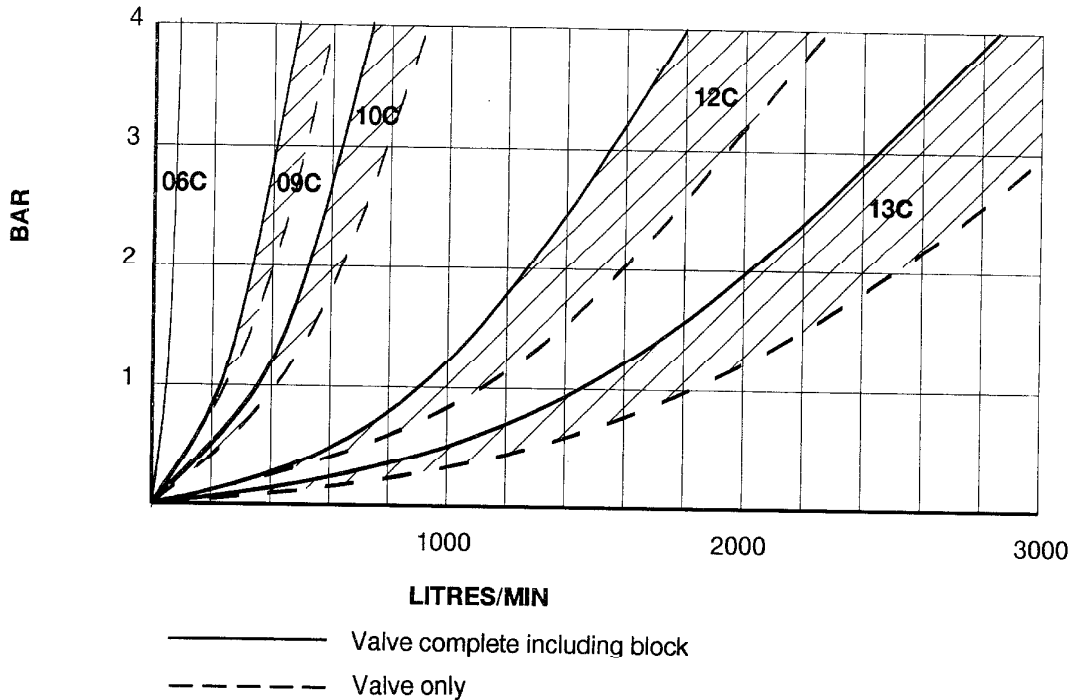
VDSHS03D-31B1ND**NBBA1

| | |
|---------------------------------|----|
| 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 |

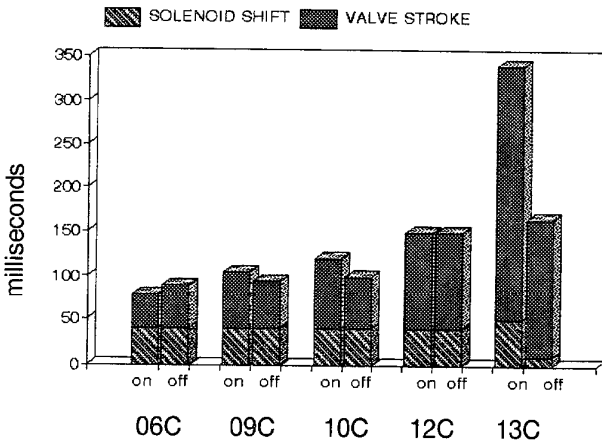
VBT - *C**
2 PORT SEATED BYPASS VALVES.
SLIP IN CARTRIDGE TO ISO7368.
PERFORMANCE DATA.

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

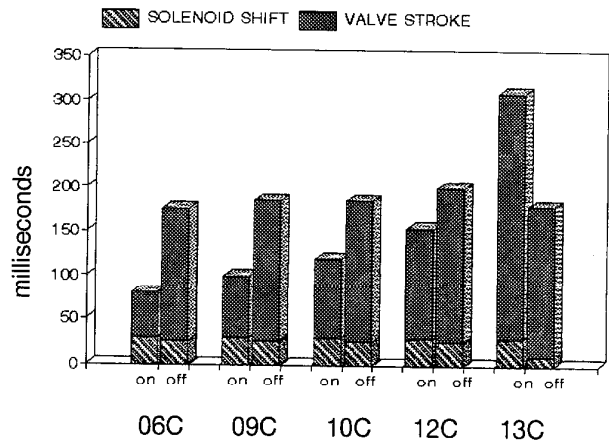
"Fluid" - mineral oil, 32 centistokes at 40°C and solenoid voltage nominal -10%, Pilot pressure 35 bar.



NORMALLY CLOSED



NORMALLY OPEN

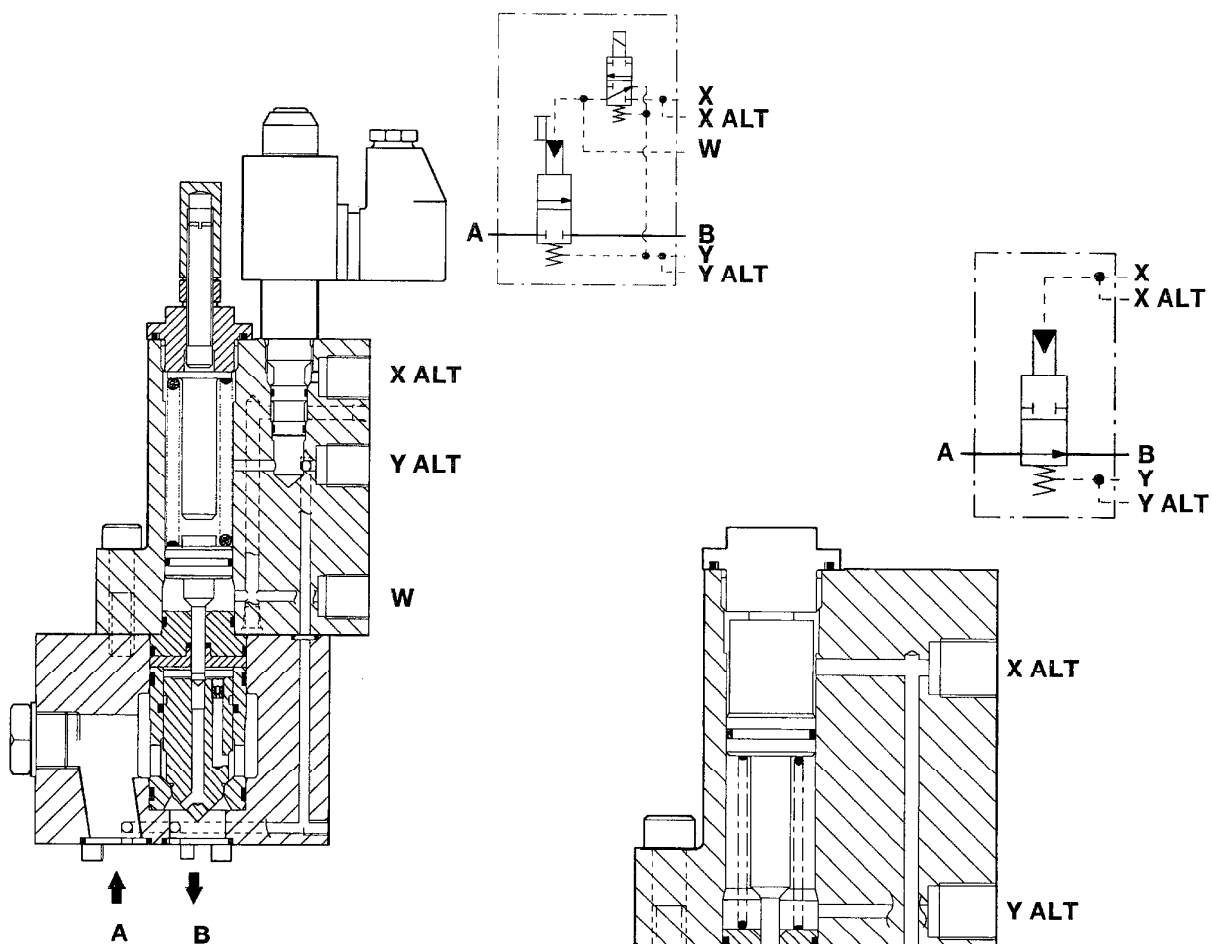


| Volume of Pilot fluid required for full stroke (ml) | |
|---|------|
| 06C | 11,4 |
| 09C | 13,7 |
| 10C | 15,4 |
| 12C | 25,1 |
| 13C | 22,0 |

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.



NORMALLY CLOSED VALVE, SOLENOID PILOT WITH SEQUENCE NOT PHASED
VBWSS08P-31PHEABBA1 / VDSHS02H3 - 3JA1NDNBBA1**

NORMALLY OPEN VALVE PILOT OPERATED
VBWPA08P-31PHBNBBA1

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

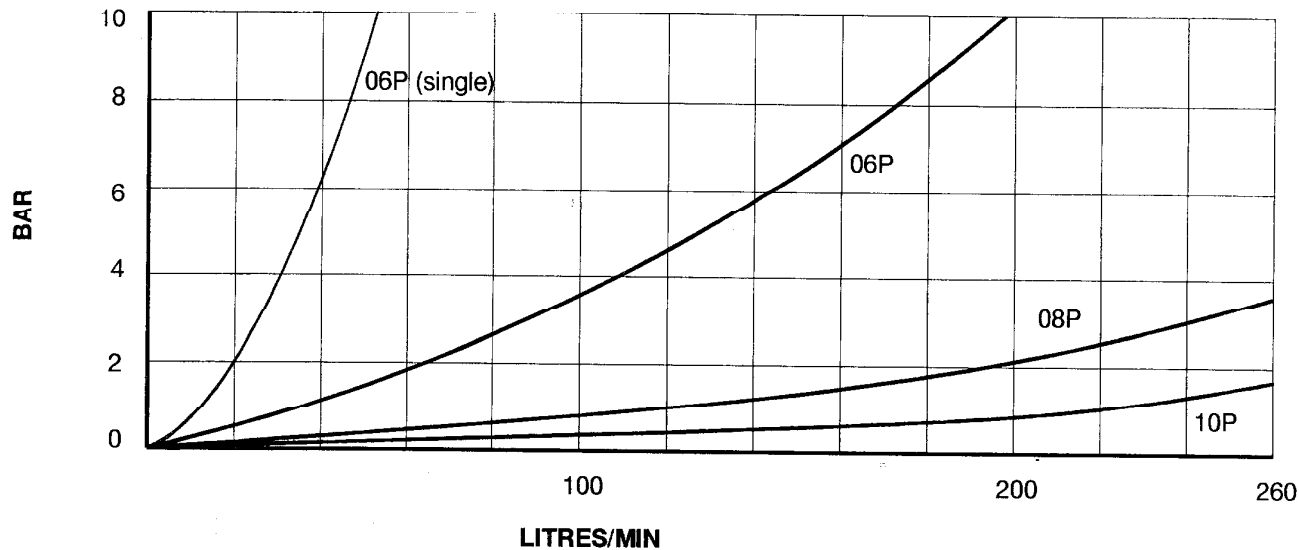
MANIFOLD MOUNTING TO ISO5781

FOR USE WITH HWBF FLUIDS

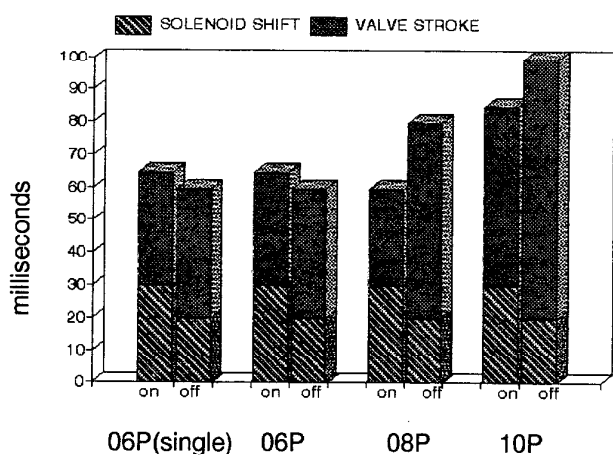
PERFORMANCE DATA.

All testing generally in accordance with BS4062 part 1

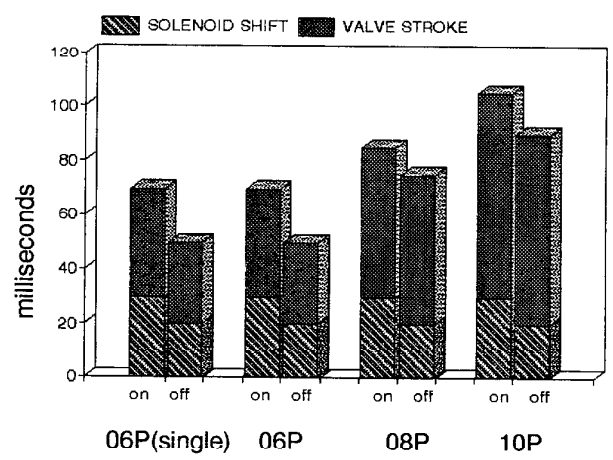
"Fluid" - mineral oil, 32 centistokes at 40°C, solenoid voltage nominal -10%, Pilot pressure 35 bar and 95/5 micro emulsion at 1 centistoke at 30°C



NORMALLY CLOSED



NORMALLY OPEN

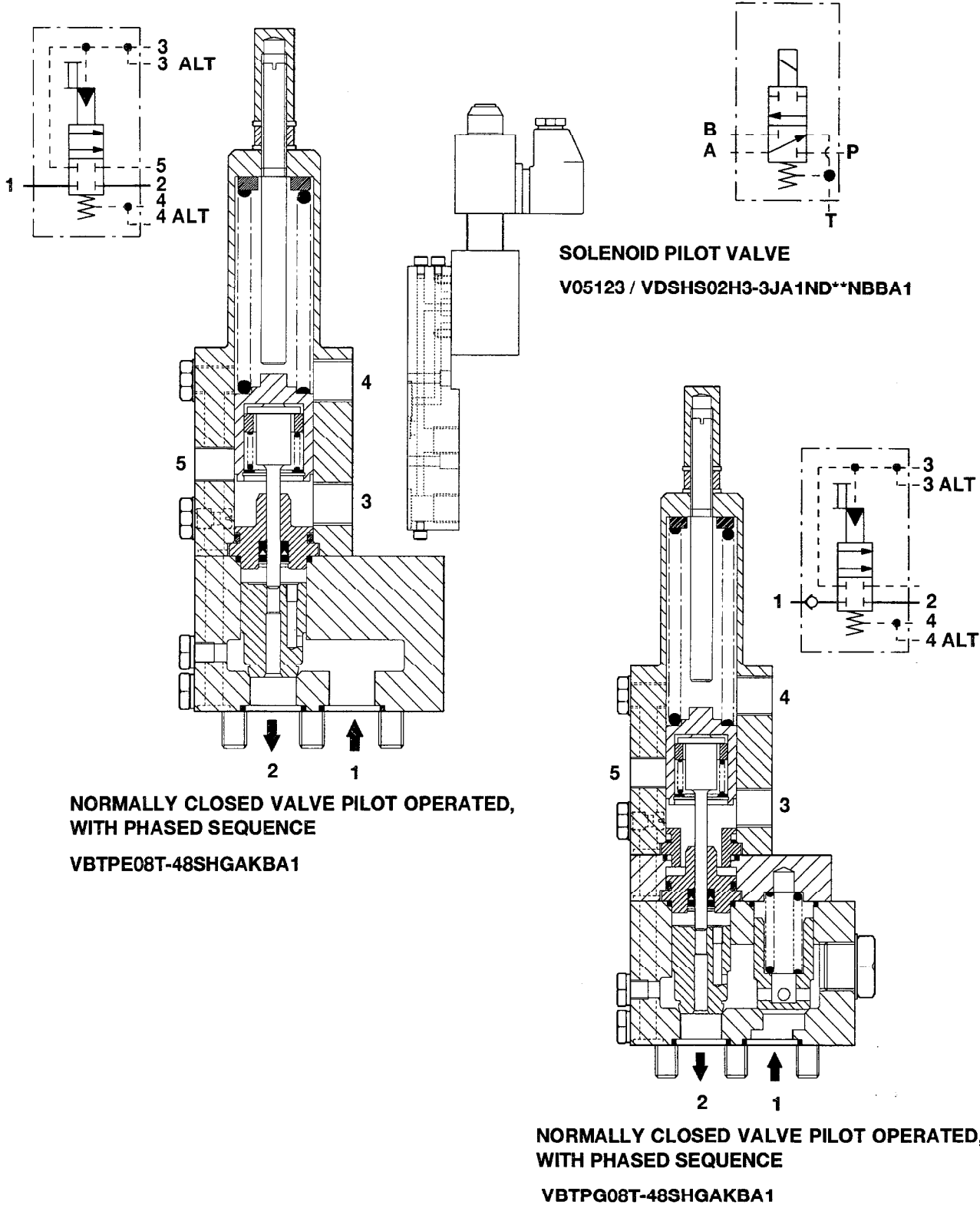


| Volume of Pilot fluid required for full stroke (ml) | |
|---|------|
| 06P All models | 7,9 |
| 08P | 9,5 |
| 10P | 10,7 |

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.

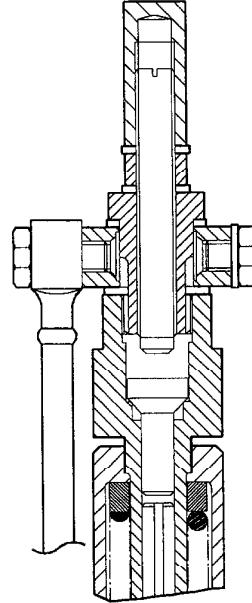
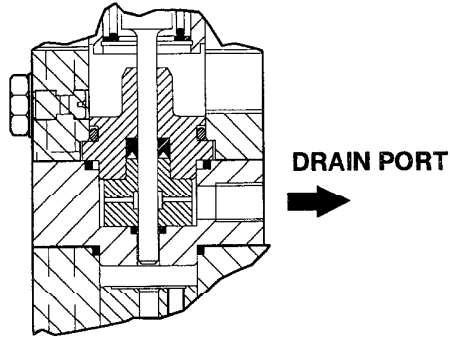
| Pilot pressure (bar) | |
|----------------------|----|
| Minimum | 17 |
| Recommended | 35 |
| Maximum | 70 |

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



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

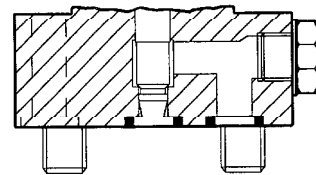
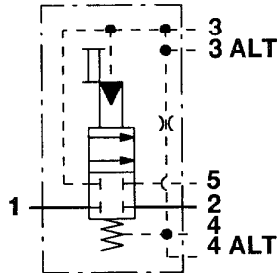
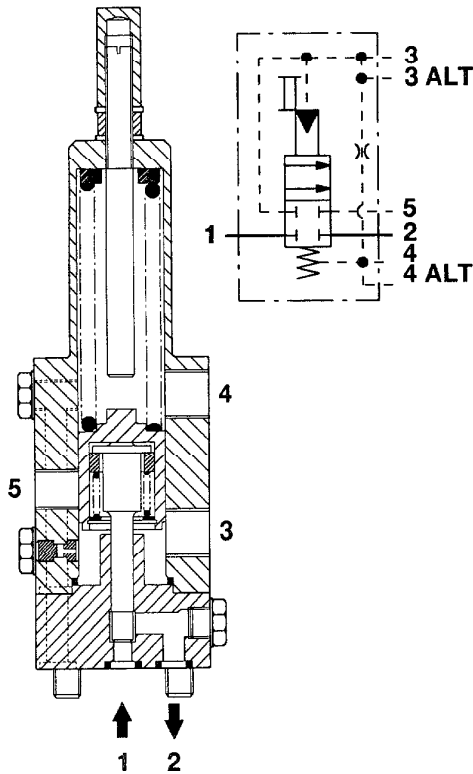
ADDITIONAL OPTIONS



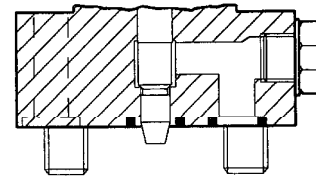
CONSTRUCTION TO SEPARATE FLUIDS

DECOMPRESSION DEVICE D

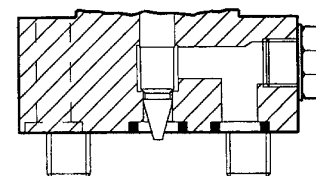
SINGLE STAGE VALVES



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

VBT- **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 :-

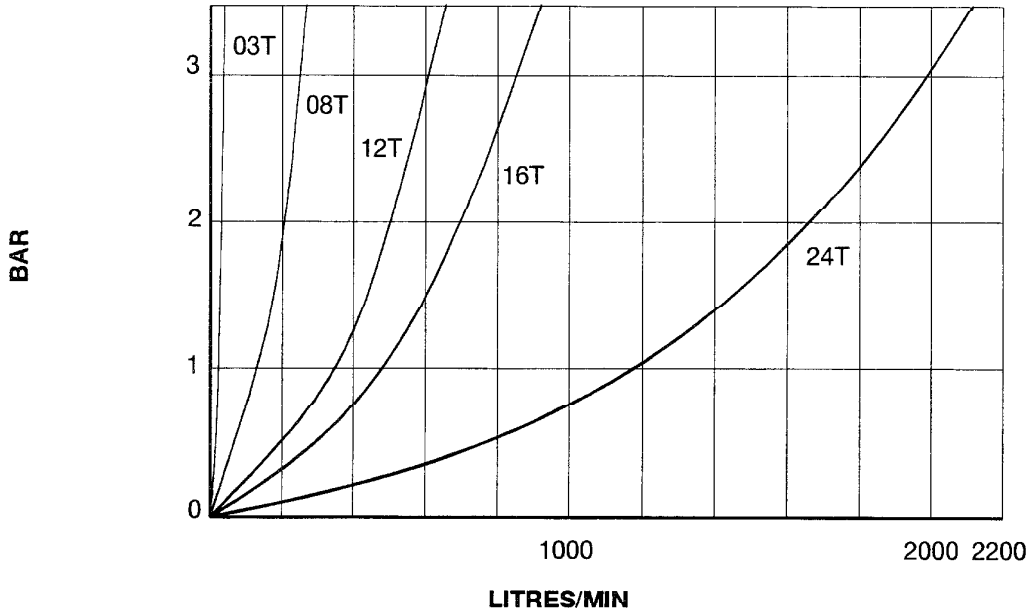
VDSHS03D-31B1ND**NBBA1

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

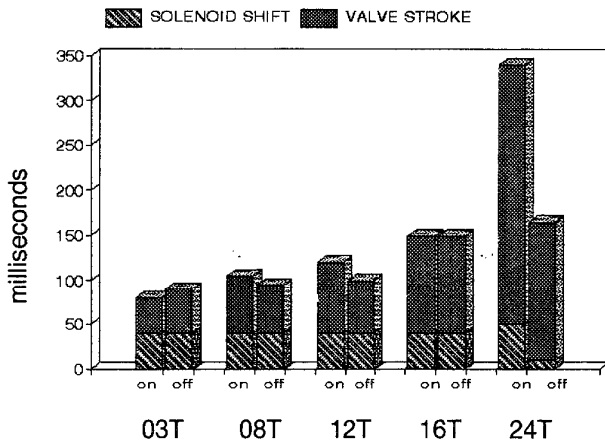
VBT - *T OR E**
2 PORT SEATED BYPASS VALVES
HOUSE STANDARD MANIFOLD MOUNTING
480 BAR AND 1200 BAR RANGES
PERFORMANCE DATA.

All testing generally in accordance with BS4062 part 1

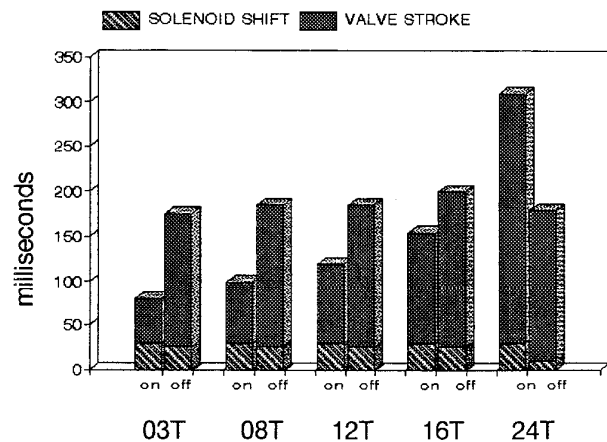
"Fluid" - mineral oil, 32 centistokes at 40°C and solenoid voltage nominal -10%, Pilot pressure 35 bar



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 |

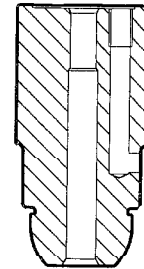
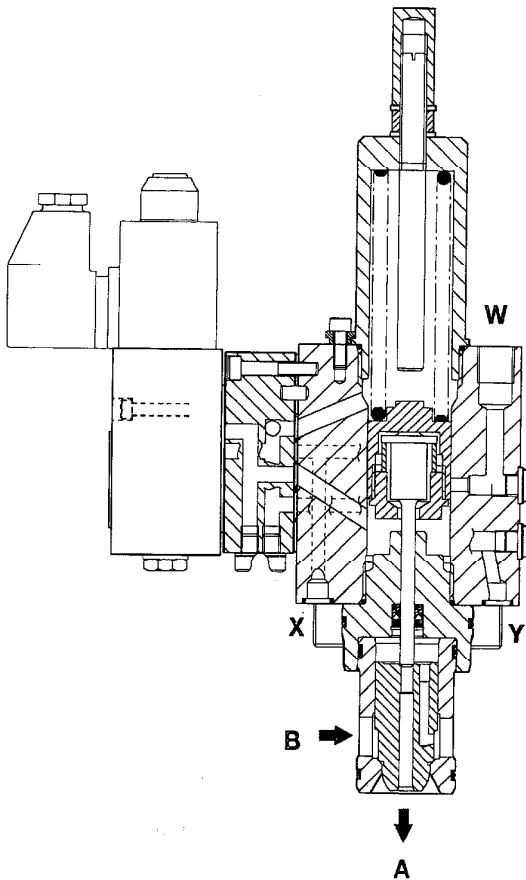
VBT - ** B
2 PORT SEATED SWITCHING VALVES
HIGH PRESSURE HOUSE STANDARD CARTRIDGE
700 BAR.

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.

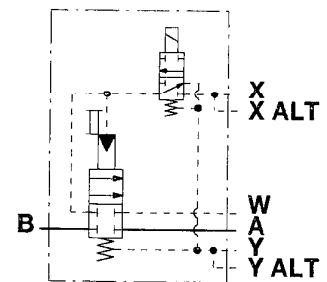
For working pressures higher than this Oilgear Towler have introduced a small range of valves capable of working at 700 bar. They are still based on ISO7368 but combine the cartridge bore element from one size with the bolt centres and drilling's from the size above.

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.

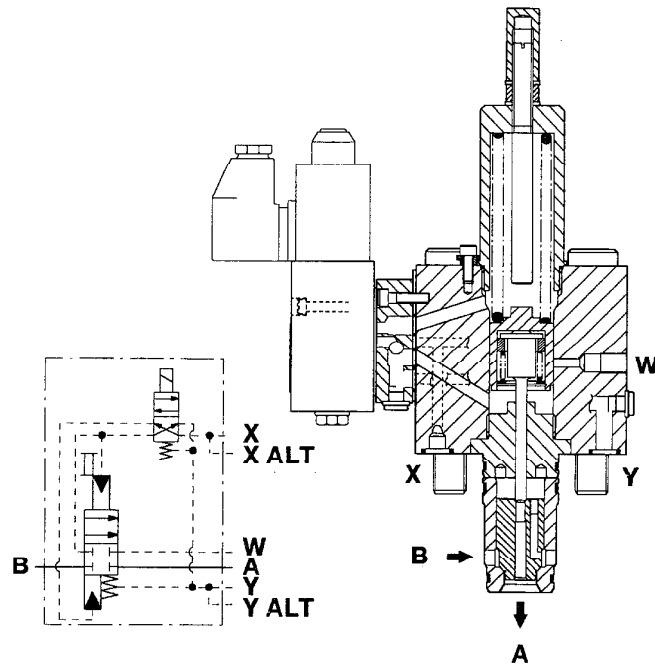


Spherical nose poppets designed specifically for individual requirements e.g. for controlled decompression.



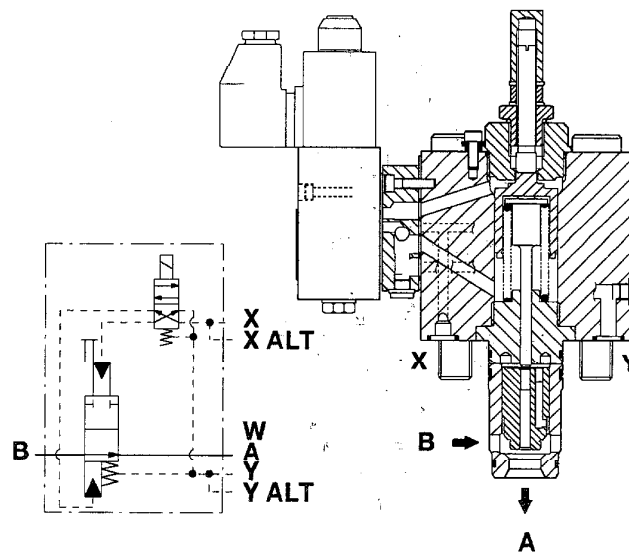
NORMALLY OPEN SOLENOID PILOT OPERATED - 700 BAR
VBTSE09B-70RHGABBA1 / VDSHS02H3-3JA1NDNBBA1**

VBT - ** 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-31B1NDNBBA1**



NORMALLY OPEN SOLENOID PILOT OPERATED - 1400 BAR

VBTSA08J-A4SHBABBA1/VDSHS03D-31B1NDNBBA1**

VBT - ** J OR JB

2 PORT SEATED SWITCHING VALVES

HIGH PRESSURE HOUSE STANDARD CARTRIDGE

1400 BAR.

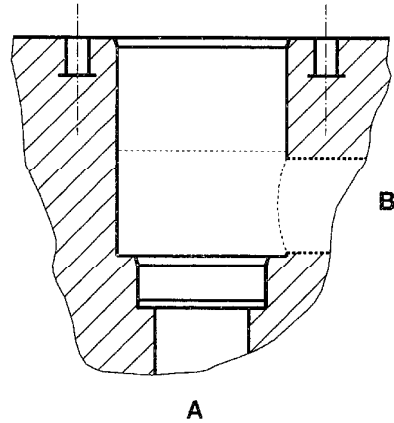
This form of VBT valve is used to control hydraulic systems with working pressures in the region of 1400 bar.

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.

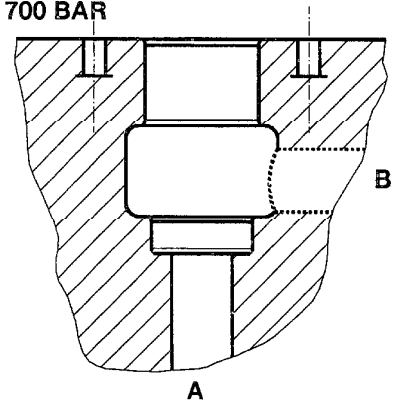
The mounting pattern is based on ISO7368 and contains elements of various sizes of valves combined together to give this particular high pressure range.

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.

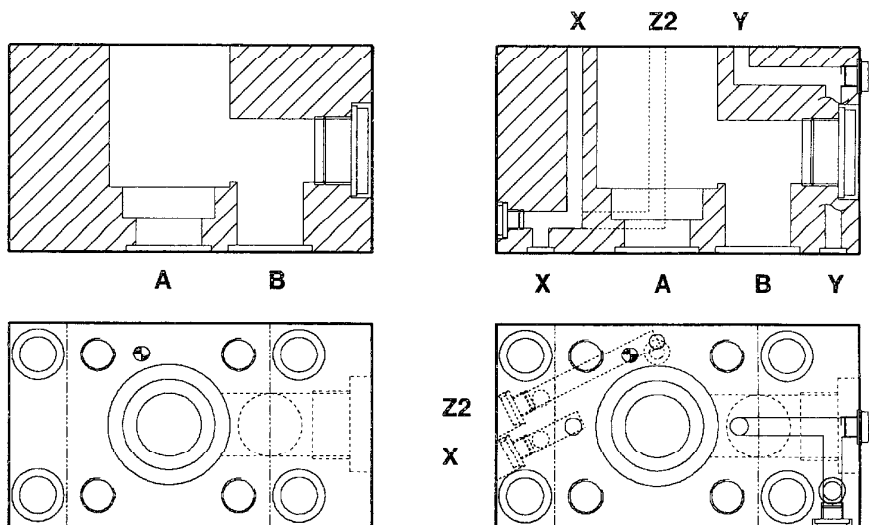
These blocks are used to convert standard cartridge valves of ISO7368 form into non-standard manifold mounting versions.

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).

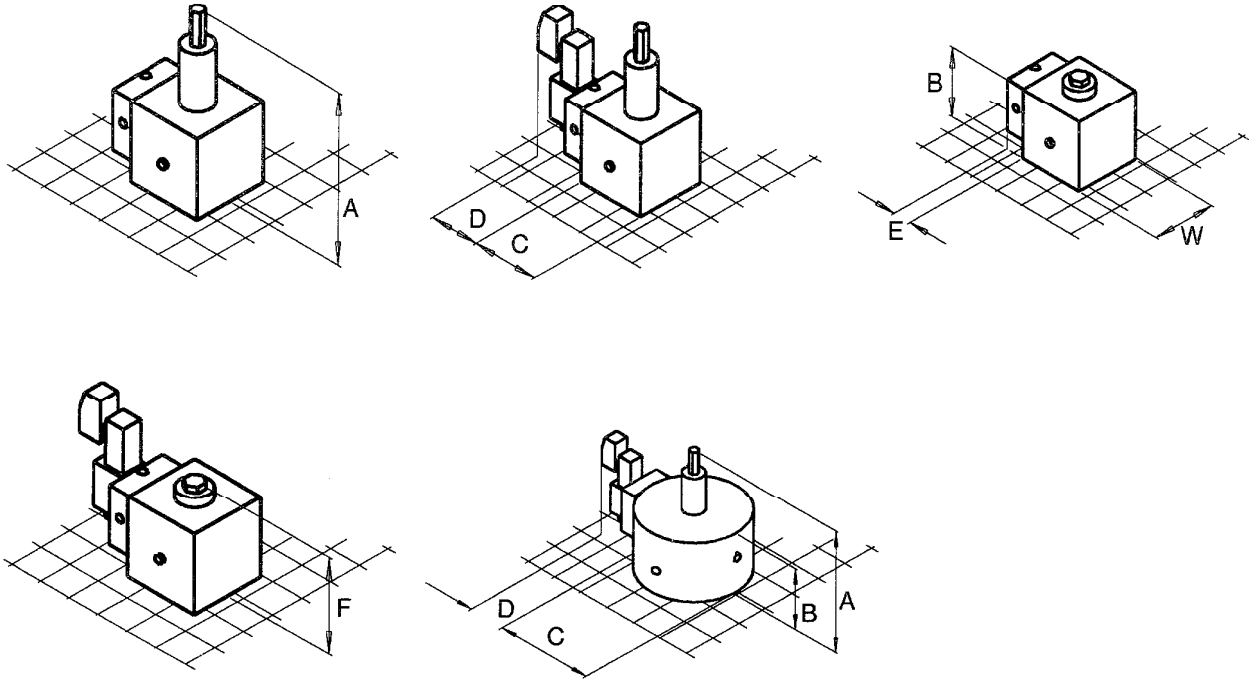
Oilgear Towler do not recommend the using of surface mounted valves for high pressures in sizes over 63mm.



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 | ∅250 |
| 13CA | 301 | 150 | 245 | 134 | 44 | 178 | ∅250 |
| 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

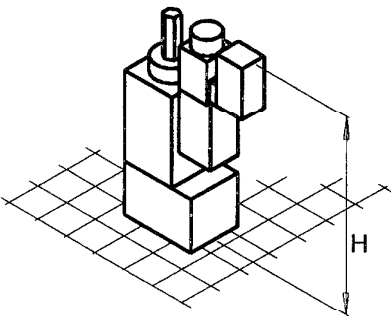
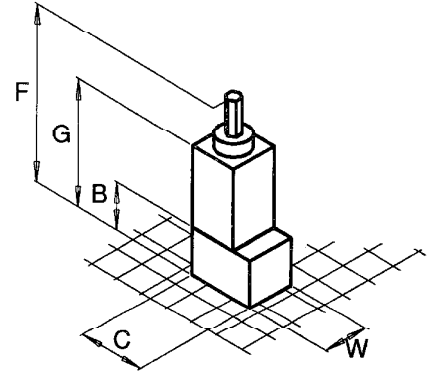
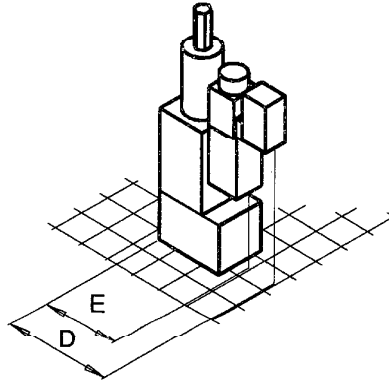
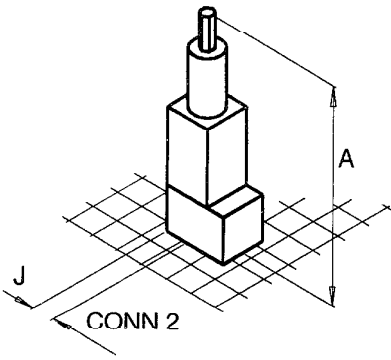
THESE DIMENSIONS ARE APPROXIMATE ONLY. CONSULT RELEVANT DATA.

GENERAL DIMENSIONAL DATA

VBT - MANIFOLD

VBW - MANIFOLD.

HIGH PRESSURE MANIFOLD VALVES - VBT

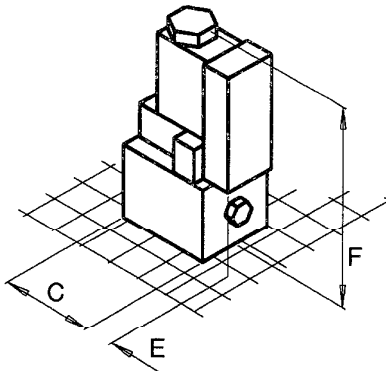
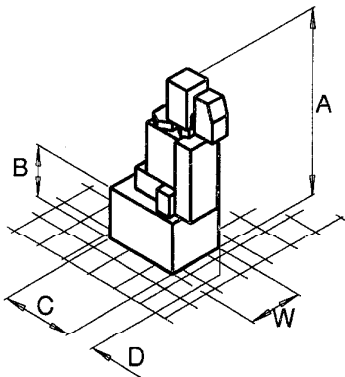


| | A | B | C | D | E | F | G | H | J | W |
|-------|-------|------|-----|-----|-----|-------|-------|-------|----|-----|
| 03T | 287 | 38 | 76 | 208 | 157 | 239 | 168 | 362 | 38 | 76 |
| 04T | 287 | 38 | 76 | 208 | 157 | 239 | 168 | 262 | 38 | 76 |
| * 08T | 331 | 76 | 115 | 208 | 157 | 277 | 206 | 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

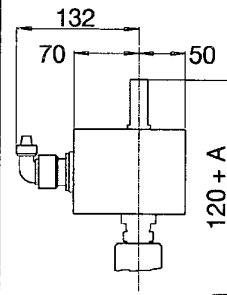


| | A | B | C | D | E | F | W |
|-----|-----|-----|-----|------|------|-----|-----|
| 06P | 333 | 88 | 110 | 54 | 20 | 243 | 90 |
| 08P | 345 | 99 | 138 | 54 | 18 | 254 | 102 |
| 10P | 402 | 156 | 150 | 52,5 | 17,5 | 311 | 127 |

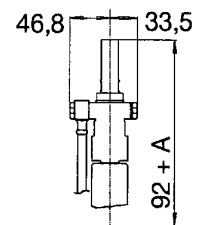
DIM TAB3 7/8/93

EXTRAS ALL TYPES

Switches for N/C Valves

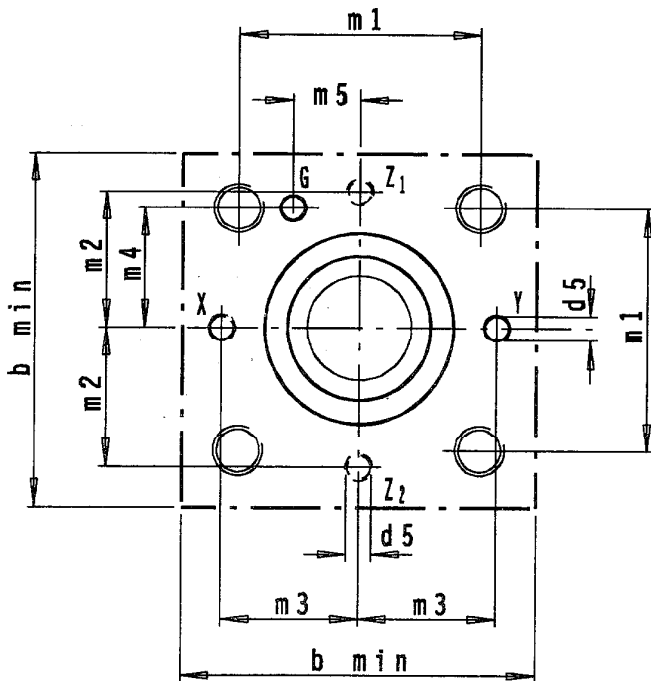
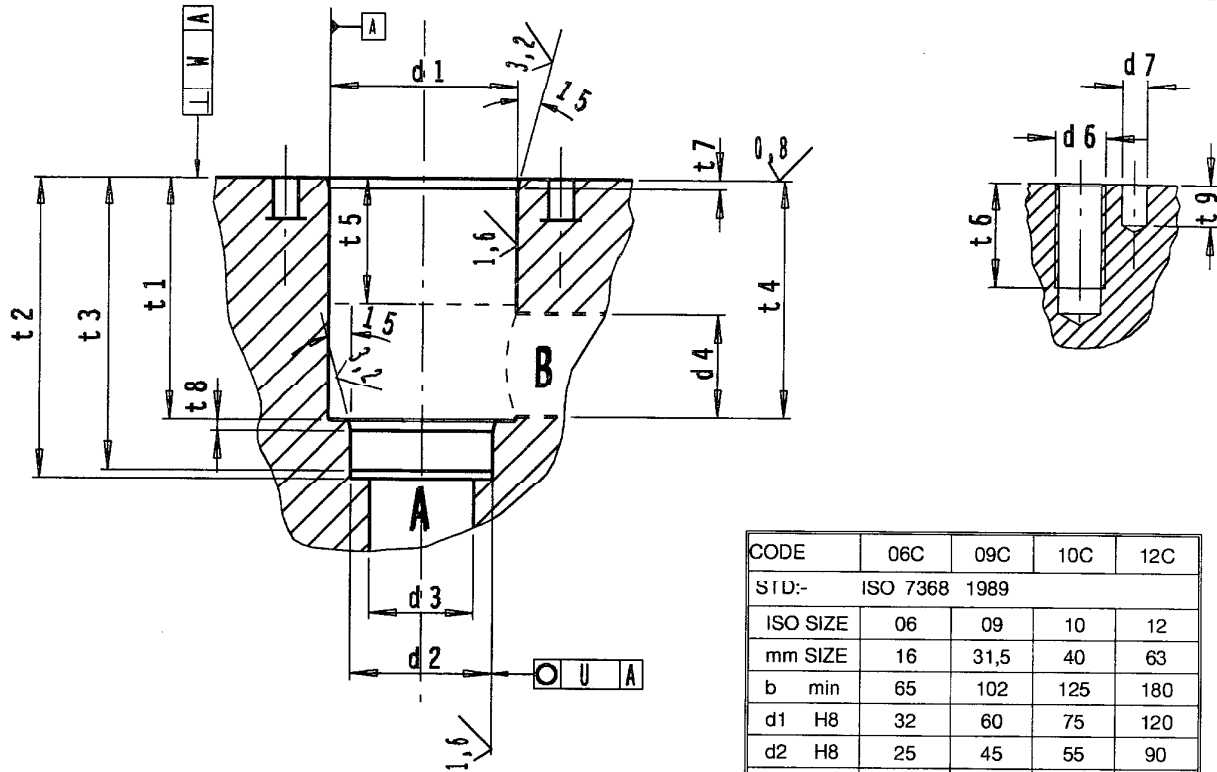


Decompression for N/C Valves



THESE DIMENSIONS ARE APPROXIMATE ONLY. CONSULT RELEVANT DATA.

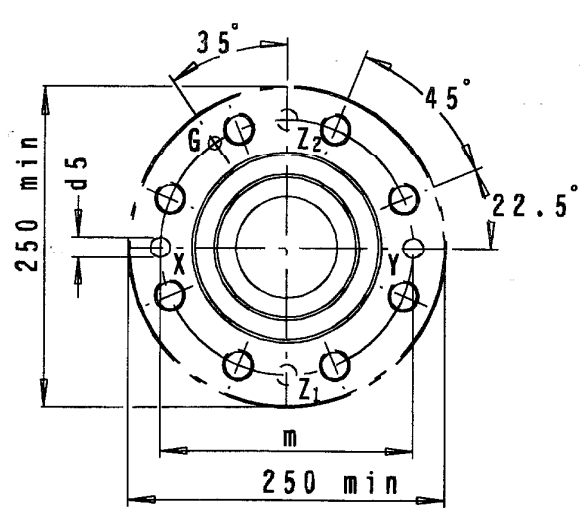
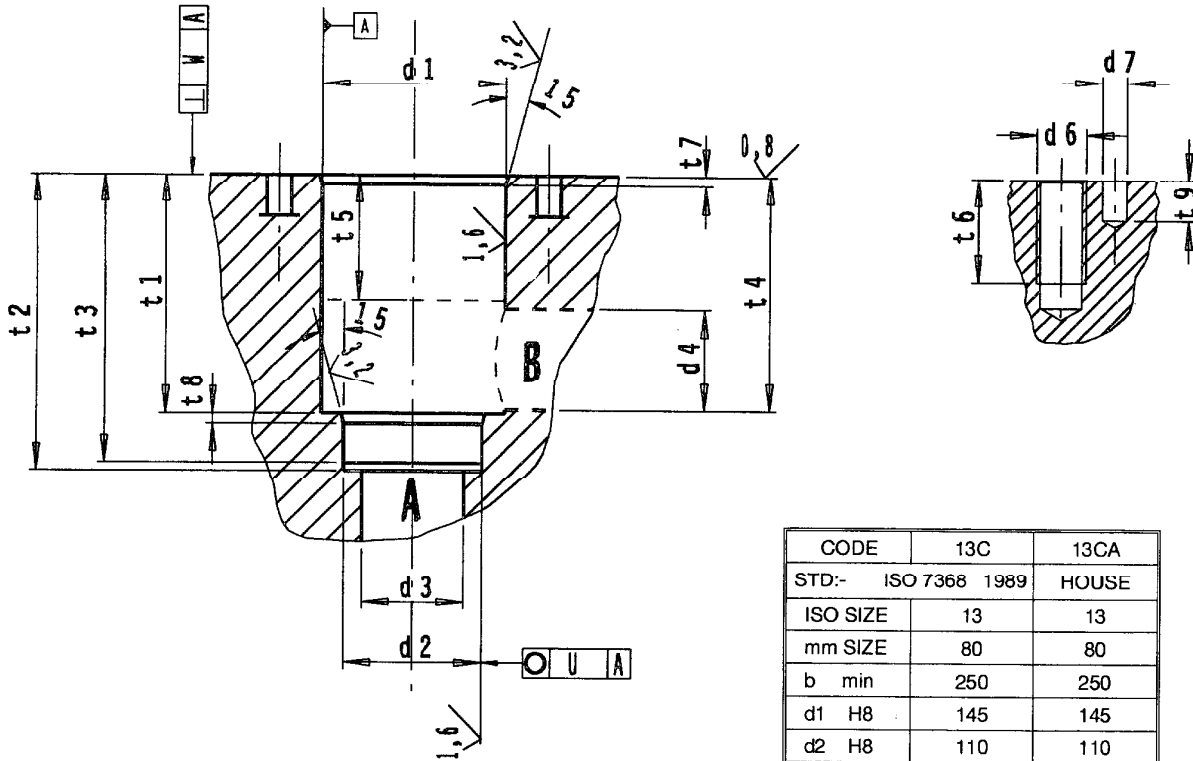
MOUNTING PATTERN
2 PORT SEATED BYPASS VALVES
CARTRIDGE MOUNTING TO ISO7368
500 BAR
FOR VBT - 06C TO 12C.



| CODE | 06C | 09C | 10C | 12C |
|----------|---------------|------|------|------|
| STD:- | ISO 7368 1989 | | | |
| ISO SIZE | 06 | 09 | 10 | 12 |
| mm SIZE | 16 | 31,5 | 40 | 63 |
| b min | 65 | 102 | 125 | 180 |
| d1 H8 | 32 | 60 | 75 | 120 |
| d2 H8 | 25 | 45 | 55 | 90 |
| d3 max | 16 | 32 | 40 | 63 |
| d4 | 16 | 31,5 | 40 | 63 |
| d5 max | 4 | 8 | 10 | 12 |
| d6 | M8 | M16 | M20 | M30 |
| d7 H13 | 4 | 6 | 6 | 8 |
| m1 ±0,2 | 46 | 70 | 85 | 125 |
| m2 ±0,2 | 25 | 41 | 50 | 75 |
| m3 ±0,2 | 25 | 41 | 50 | 75 |
| m4 ±0,2 | 23 | 35 | 42,5 | 62,5 |
| m5 ±0,2 | 10,5 | 17 | 23 | 38 |
| t1 +0,1 | 43 | 70 | 87 | 130 |
| t2 +0,1 | 56 | 85 | 105 | 155 |
| t3 | 54 | 83 | 102 | 150 |
| t4 max | 42,5 | 68,5 | 84,5 | 127 |
| t5 | 20 | 30 | 30 | 40 |
| t6 max | 22 | 38 | 46 | 66 |
| t7 | 2 | 2,5 | 3 | 4 |
| t8 | 2 | 2,5 | 3 | 4 |
| t9 min | 8 | 8 | 8 | 8 |
| U | 0,03 | 0,03 | 0,05 | 0,05 |
| W | 0,05 | 0,1 | 0,1 | 0,2 |

ISO 7368a 6/3/93

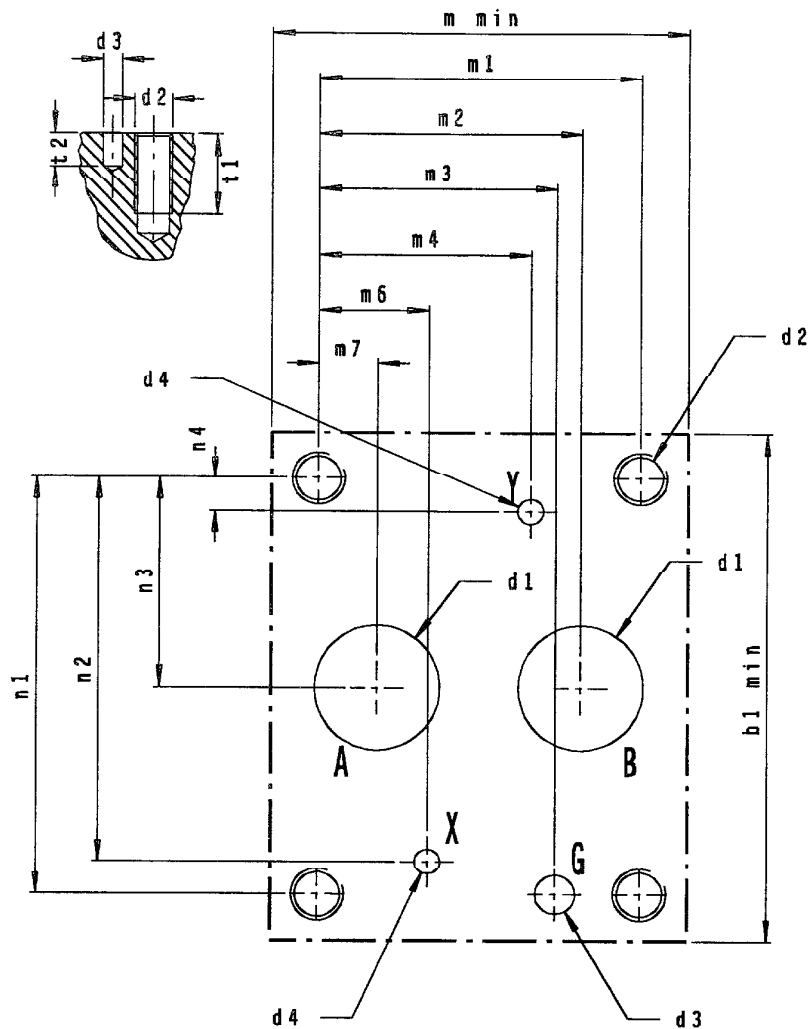
MOUNTING PATTERN
2 PORT SEATED BYPASS VALVES
CARTRIDGE MOUNTING TO ISO7368
500 BAR
FOR VBT - 13C OR 13CA.



| 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 6/3/93

MOUNTING PATTERN

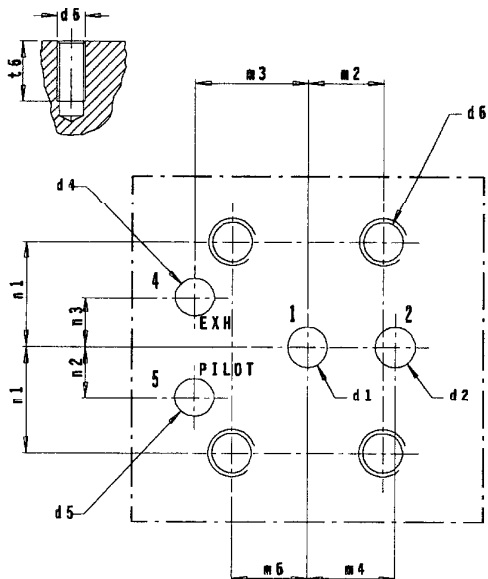
2 PORT SEATED BYPASS VALVES

HOUSE STANDARD MANIFOLD MOUNTING

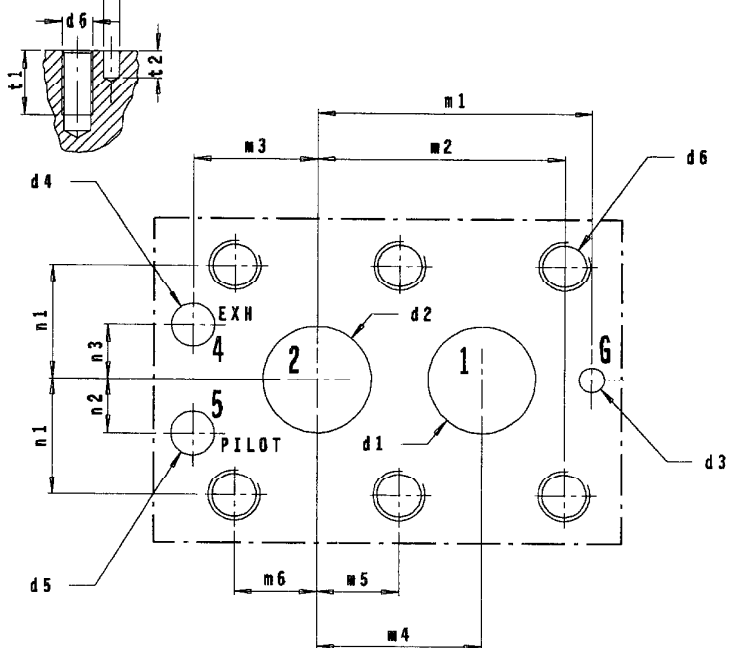
480 - 1400 BAR

FOR VBT - ** T OR E.

SIZE 03 AND 04



SIZE 08, 12, 16 AND 24

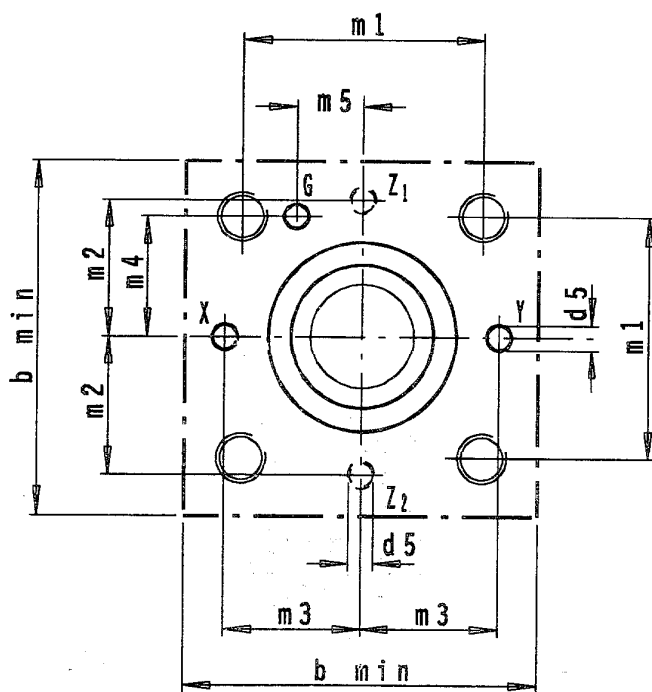
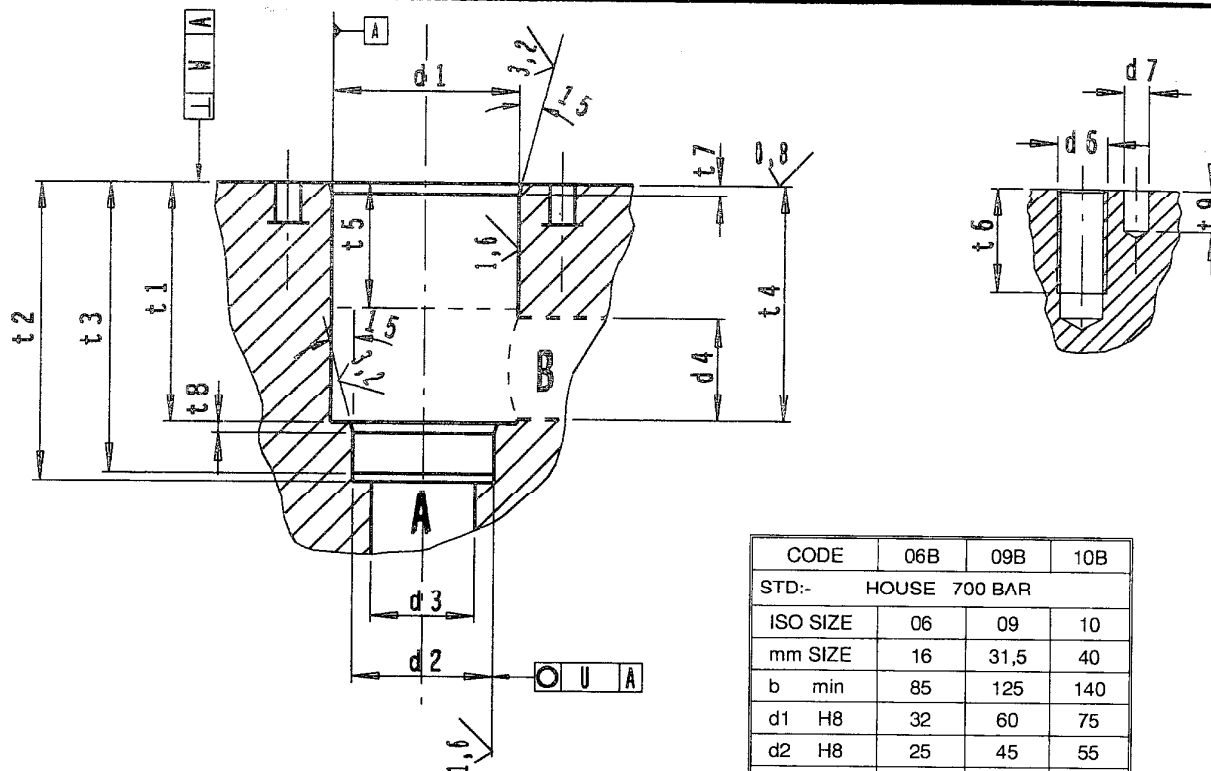


Sizes 03T, 04T and 04E Port designations 2&1 are 1&2

| 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 6/3/93

MOUNTING PATTERN
2 PORT SEATED BYPASS VALVES
HOUSE STANDARD CARTRIDGE MOUNTING
700 BAR
FOR VBT - ★★ B.



| CODE | 06B | 09B | 10B |
|----------|---------------|------|------|
| STD:- | HOUSE 700 BAR | | |
| ISO SIZE | 06 | 09 | 10 |
| mm SIZE | 16 | 31,5 | 40 |
| b min | 85 | 125 | 140 |
| d1 H8 | 32 | 60 | 75 |
| d2 H8 | 25 | 45 | 55 |
| d3 max | 16 | 32 | 40 |
| d4 | 16 | 31,5 | 40 |
| d5 max | 6 | 10 | 10 |
| d6 | M12 | M20 | M24 |
| d7 H13 | 6 | 6 | 8 |
| m1 ±0,2 | 58 | 85 | 100 |
| m2 ±0,2 | 33 | 50 | 58 |
| m3 ±0,2 | 33 | 50 | 58 |
| m4 ±0,2 | 29 | 42,5 | 50 |
| m5 ±0,2 | 16 | 23 | 30 |
| t1 +0,1 | 43 | 70 | 87 |
| t2 +0,1 | 56 | 85 | 105 |
| t3 | 54 | 83 | 102 |
| t4 max | 42,5 | 68,5 | 84,5 |
| t5 | 20 | 30 | 30 |
| t6 max | 30 | 46 | 46 |
| t7 | 2 | 2,5 | 3 |
| t8 | 2 | 2,5 | 3 |
| t9 min | 8 | 8 | 8 |
| U | 0,03 | 0,03 | 0,05 |
| W | 0,05 | 0,1 | 0,1 |

ISO7368d 6/3/93

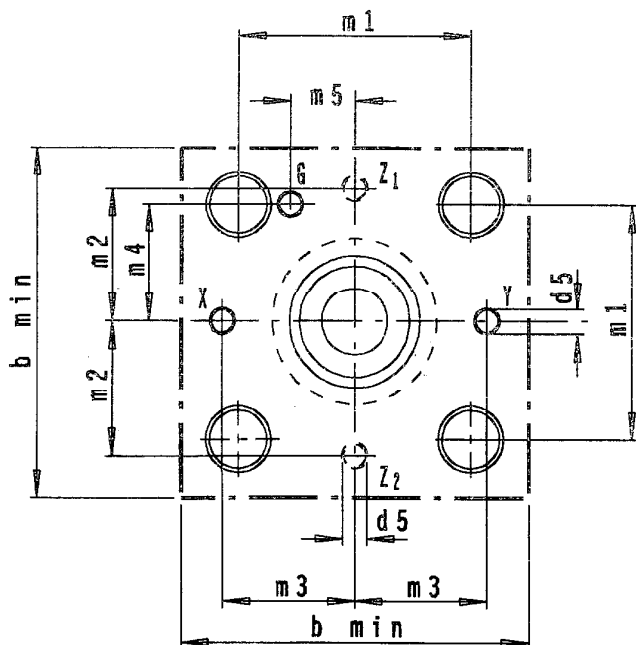
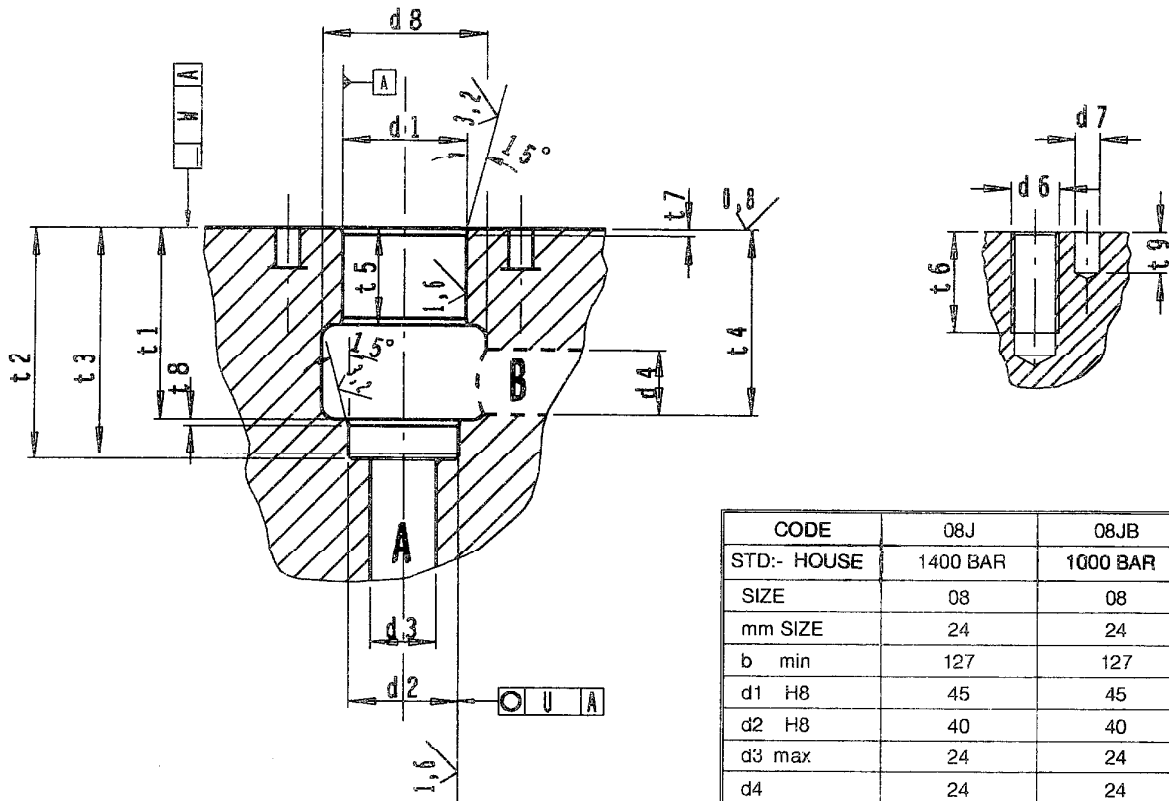
MOUNTING PATTERN

2 PORT SEATED BYPASS VALVES

HOUSE STANDARD CARTRIDGE MOUNTING

1400 BAR

FOR VBT - ** J OR JB.

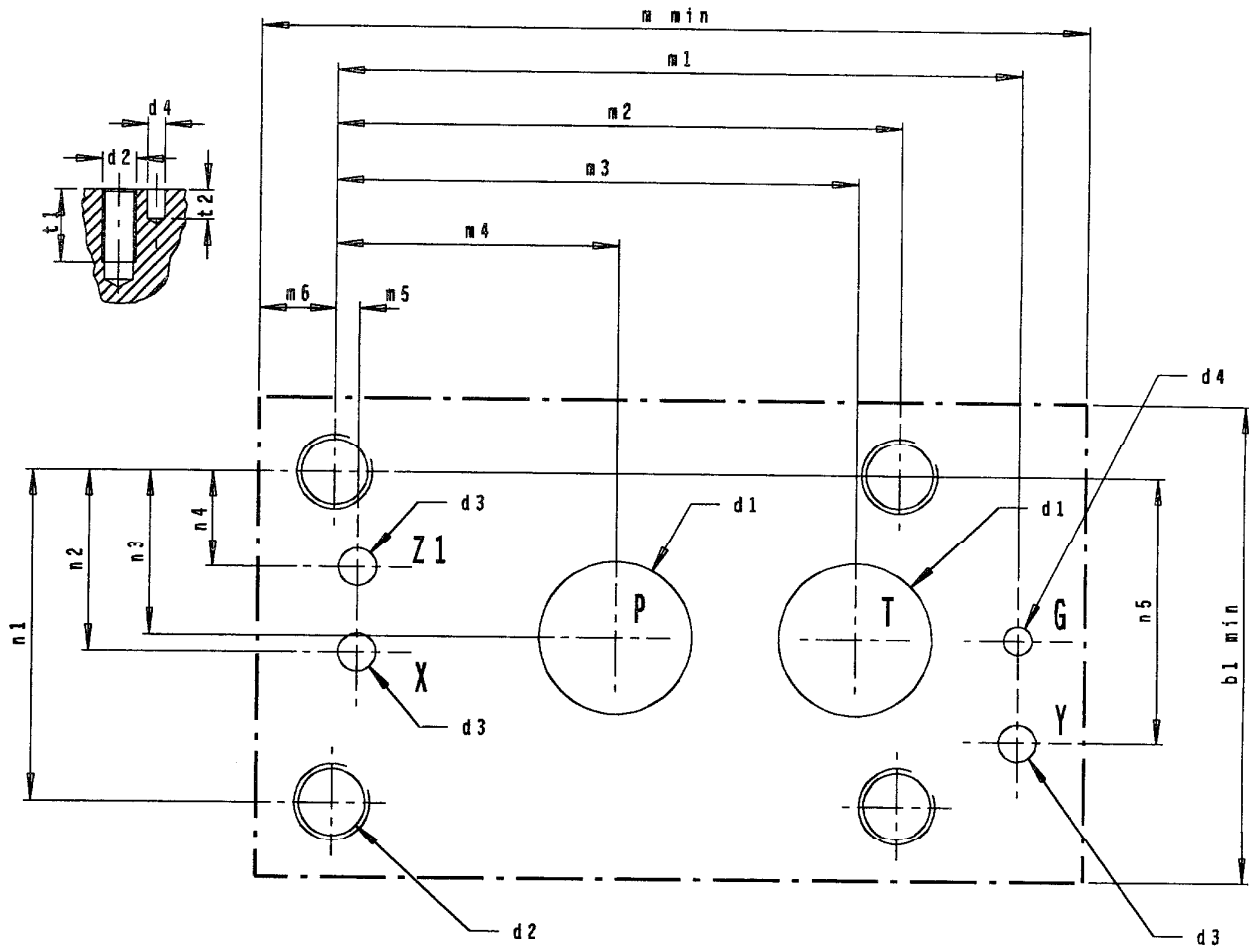


| CODE | 08J | 08JB |
|-------------|----------|----------|
| STD:- HOUSE | 1400 BAR | 1000 BAR |
| SIZE | 08 | 08 |
| mm SIZE | 24 | 24 |
| b min | 127 | 127 |
| d1 H8 | 45 | 45 |
| d2 H8 | 40 | 40 |
| d3 max | 24 | 24 |
| d4 | 24 | 24 |
| d5 max | 10 | 10 |
| d6 | M24 | M20 |
| d7 H13 | 6 | 6 |
| d8 | 60 | 60 |
| m1 ±0,2 | 85 | 85 |
| m2 ±0,2 | 50 | 50 |
| m3 ±0,2 | 50 | 50 |
| m4 ±0,2 | 42,5 | 42,5 |
| m5 ±0,2 | 17 | 17 |
| t1 +0,1 | 70 | 70 |
| t2 +0,1 | 85 | 85 |
| t3 | 83 | 83 |
| t4 max | 68 | 68 |
| t5 | 32,5 | 32,5 |
| t6 max | 30 | 30 |
| t7 | 2,5 | 2,5 |
| t8 | 2,5 | 2,5 |
| t9 min | 10 | 10 |
| U | 0,02 | 0,02 |
| W | 0,1 | 0,1 |

OGT_J 6/3/83

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 | 18 | 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

2300 South 51st Street
Milwaukee, WI USA 53219
Call toll free 1-800-558-6636
In WI call (414) 327-1700
Fax (414) 327-0532
Telex 2-69411

ISSUED 09/93.

Bulletin 80225