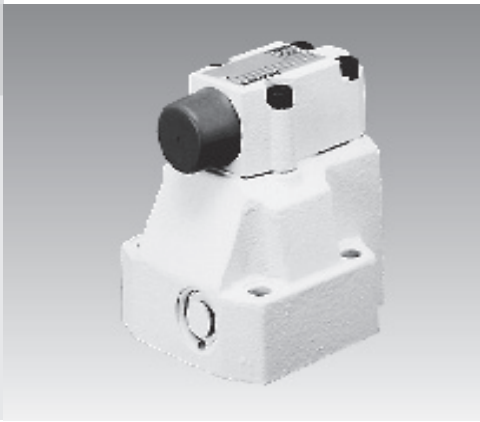
Rexroth
Bosch Group

# Pressure reducing valve, pilot operated

**RA 26892/02.03** **1**/10
Replaces: 06.98

**Model DR**



Nominal sizes 10 to 32
Series 5X
Maximum operating pressure 350 bar (5000 PSI)
Maximum flow 400 L/min (105 GPM)

## Table of contents



## Features

- Mounts on standard ISO 5781-**06**, **08** or **10**, NFPA/ANSI **P 06**, **P 08** or **P 10** interfaces
- For threaded connections
- For manifold mounting
- Four adjustment elements:
  - Rotary knob
  - Sleeve with hexagon and protective cap
  - Lockable rotary knob with scale
  - Rotary knob with scale
- Five pressure stages
- Check valve, optional (only for subplate mounting valves).

## Ordering details

**DR** [ ] [ ] [ ] **– 5X /** [ ] **Y** [ ] [ ] [ ] *****

Pilot operated valve = **No code**
Pilot operated valve = **C**
**without** main spool insert
(do **not** enter nom. size)
Pilot operated valve = **C**
**with** main spool insert
(enter valve size 30)

| Nom. size | Valve for: Subplate mounting "–" | Valve for: Threaded connections "G" |
|---|---|---|
| | Ordering details | |
| 10 | **= 10** | **= 10** (G 1/2) |
| 16 | | **= 15** (G 3/4) |
| 25 | **= 20** | **= 20** (G 1) |
| 25 | | **= 25** (G 1-1/4) |
| 32 | **= 30** | **= 30** (G 1-1/2) |

For subplate mounting = **–**
For threaded connections = **G**

**Adjustment element**
Rotary knob = **4**
Sleeve with hexagon and protective cap = **5**
Lockable rotary knob with scale = **6** [1]
Rotary knob with scale = **7**

Further details in clear text

Thread for "X" and "Y" port
**No code =** BSP threaded port
**12 =** SAE threaded port

**No code =** NBR seals
**V =** FKM seals
(other seals on request)
⚠ **Attention!**
The compatibility of the seals and pressure fluid has to be taken into account!

**No code** [3] **=** **With** check valve
**M =** **Without** check valve

**Pilot oil supply**
**Y =** Internal pilot oil supply, external pilot oil drain

**50 =** Settable pressure up to 50 bar (725 PSI)
**100 =** Settable pressure up to 100 bar (1450 PSI)
**200 =** Settable pressure up to 200 bar (2900 PSI)
**315 =** Settable pressure up to 315 bar (4568 PSI)
**350** [2] **=** Settable pressure up to 350 bar (5076 PSI)

**5X =** Series 50 to 59
(50 to 59: unchanged installation and connection dimensions)

[1] H-key to Material No. **R900008158** is included within the scope of supply
[2] Only possible for version **without** check valve
[3] Only available as pilot operated valve for subplate mounting

## Standard types

| Type | Material number |
|---|---|
| DR 10 -5-5X/100Y | R900596766 |
| DR 10 -5-5X/200Y | R900503741 |
| DR 10 -5-5X/315Y | R900596883 |
| DR 20 -5-5X/100Y | R900597198 |
| DR 20 -5-5X/200Y | R900597892 |
| DR 20 -5-5X/315Y | R900597048 |
| DR 30 -5-5X/100Y | R900596339 |
| DR 30 -5-5X/200Y | R900596500 |
| DR 30 -5-5X/315Y | R900596928 |

## Functional description, cross-section

Type DR pressure valves are pilot operated pressure reducing valves, which are controlled from the secondary circuit.

They basically consist of main valve (1) with main spool insert (3) and pilot control valve (2) with pressure adjustment element.

At rest, the valves are open, this means that fluid can freely pass from port B, to port A via the main spool insert (3).

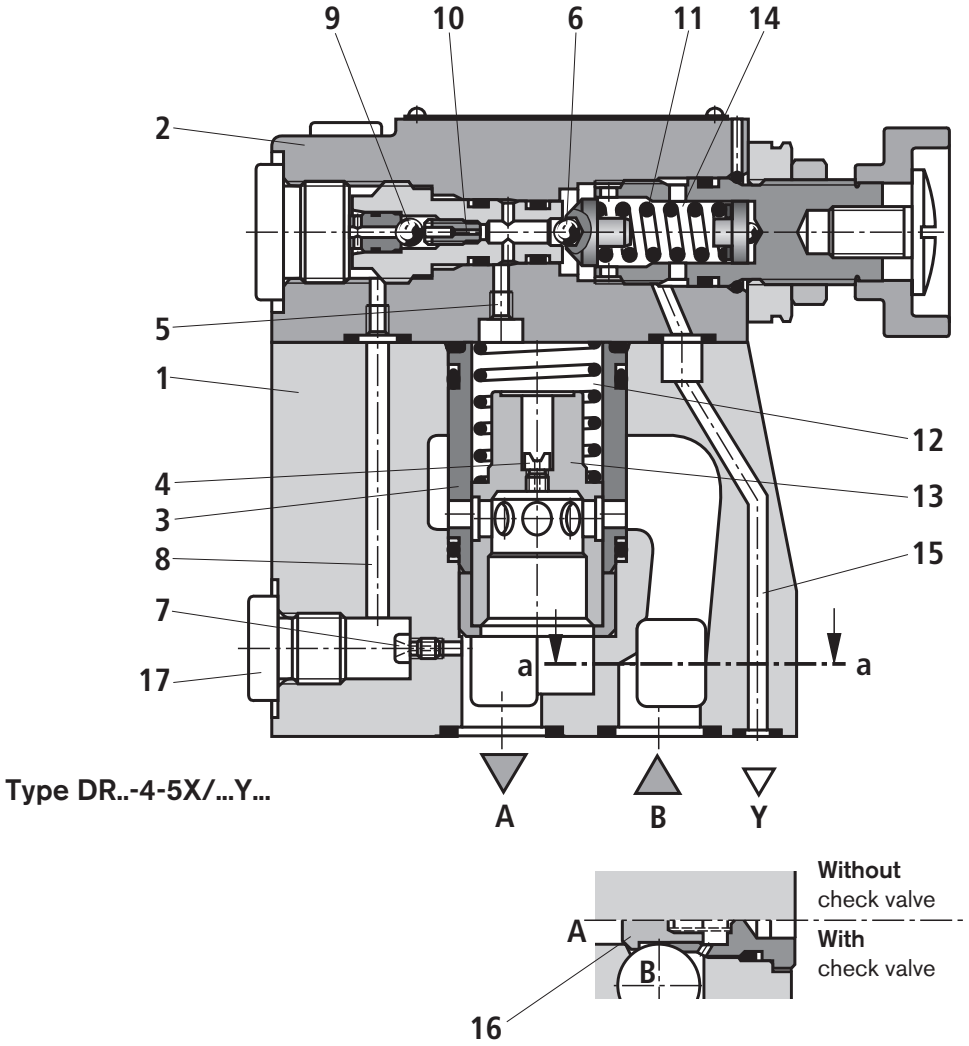
Pressure present in port A acts on the under side of the main spool. At the same time there is pressure acting on the ball (6) in the pilot control valve (2) via the orifice (4) on the spring-loaded side of the main spool (3) and via port (5). This pressure also acts on the ball (6), via the orifice (7), control line (8), check valve (9) and orifice (10). Depending on the setting of spring (11), pressure builds up in front of the ball (6), in port (5) and in spring chamber (12), which holds the control spool (13) in the open position. Pressure fluid can freely flow from port B to port A via mian spool insert (3) until the pressure in port A exceeds the value set at spring (11) and opens the ball (6). The control spool (13) moves to the closed position.

The desired reduced pressure is achieved, when a balance between the pressure in port A and the pressure set at spring (11) is reached.

Pilot oil drain from spring chamber (14) to tank always takes place externally via control line (15).

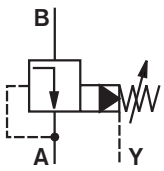
Free return flow from port A to port B can be achieved by installing an optional check valve (16).

A pressure gauge connection (17) allows the reduced pressure in port A to be monitored.

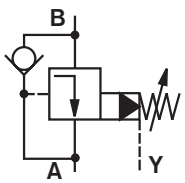



**Type DR..-4-5X/...Y...**

## Symbols




**Type DR..-.-5X/...YM..**




**Type DR..-.-5X/...Y..** (only for subplate mounting)

## **Technical data** (for applications outside these parameters, please consult us!)

### General

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Installation | | | | Optional | | | | |
| Ambient temperature range | | | °C (°F) | – 30 to + 50 for NBR seals | | | | |
| | | | °C (°F) | – 20 to + 50 for FKM seals | | | | |
| Weight | | | | DR 10 | DR 16 | DR 20 | DR 25 | DR 32 |
| | Subplate mounting | DR… | kg (lbs) | 3.4 (7.5) | – | 5.3 (11.7) | – | 8.0 (17.7) |
| | | DRC… | kg (lbs) | 1.2 (2.7) | | | | |
| | | DRC 30… | kg (lbs) | 1.5 (3.3) | | | | |
| | Threaded connections | DR..G… | kg (lbs) | 5.3 (11.7) | 5.2 (11.5) | 5.1 (11.3) | 5.0 (11) | 4.8 (10.6) |

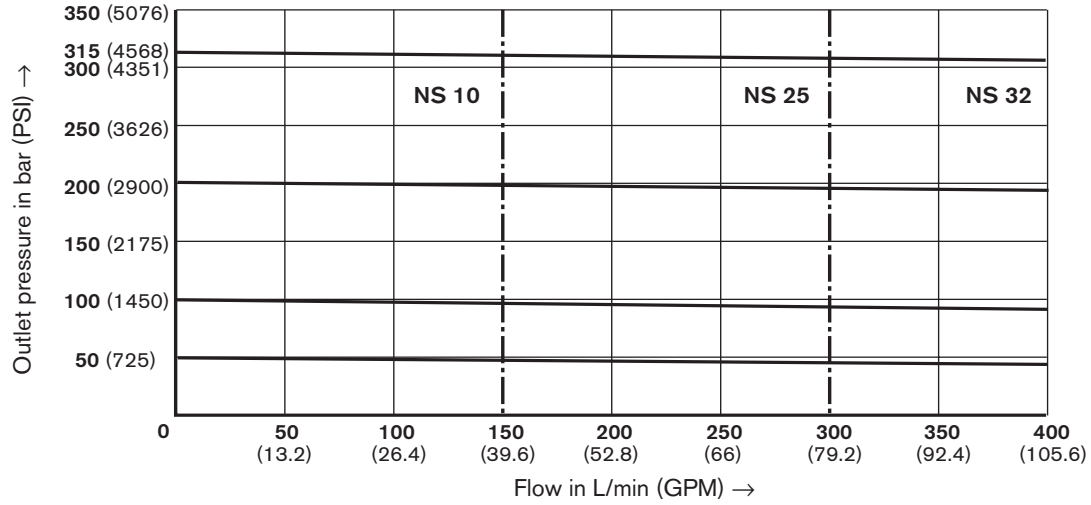
### Hydraulic

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Nominal pressure | | | bar (PSI) | 350 (5000) [1] | | | | |
| Maximum operating pressure at port B | | | bar (PSI) | 350 (5000) [1] | | | | |
| Operating pressure range at port A | | | bar (PSI) | 10 to 350 ( 145 to 5000) [1] | | | | |
| Maximum back pressure at port Y | | | bar (PSI) | 350 (5000) [1] | | | | |
| Settable pressure | | Minimum | bar (PSI) | Flow related (see characteristic curves on page 5) | | | | |
| | | Maximum | bar (PSI) | 50; 100; 200; 315; 350 (725; 1450; 2900; 4600; 5000 [1] | | | | |
| Maximum flow | | | | DR 10 | DR 16 | DR 20 | DR 25 | DR 32 |
| | Subplate mounting | | L/min (GPM) | 150 (39.6) | – | 300 (79.2) | – | 400 (105.7) |
| | Threaded connections | | L/min (GPM) | 150 (39.6) | 300 (79.2) | 300 (79.2) | 400 (105.7) | 400 (105.7) |
| Pressure fluid | | | | Mineral oil (HL, HLP) to DIN 51 524 [2];<br>Fast bio-degradable pressure fluids is to<br>VDMA 24 568 (also see RE 90 221); HETG (rape seed oil) [2];<br>HEPG (polyglycols) [3]; HEES (synthetic ester) [3];<br>Other pressure fluids on request | | | | |
| Pressure fluid temperature range | | | °C (°F) | – 30 to + 80 for NBR seals | | | | |
| | | | °C (°F) | – 20 to + 80 for FKM seals | | | | |
| Viscosity range | | | $mm^2/s$ (SUS) | 10 to 800 | | | | |
| Cleanliness class to ISO code | | | | Maximum permissible degree of contamination of the pressure fluid is to ISO 4406 (C) class 20/18/15 [4] | | | | |

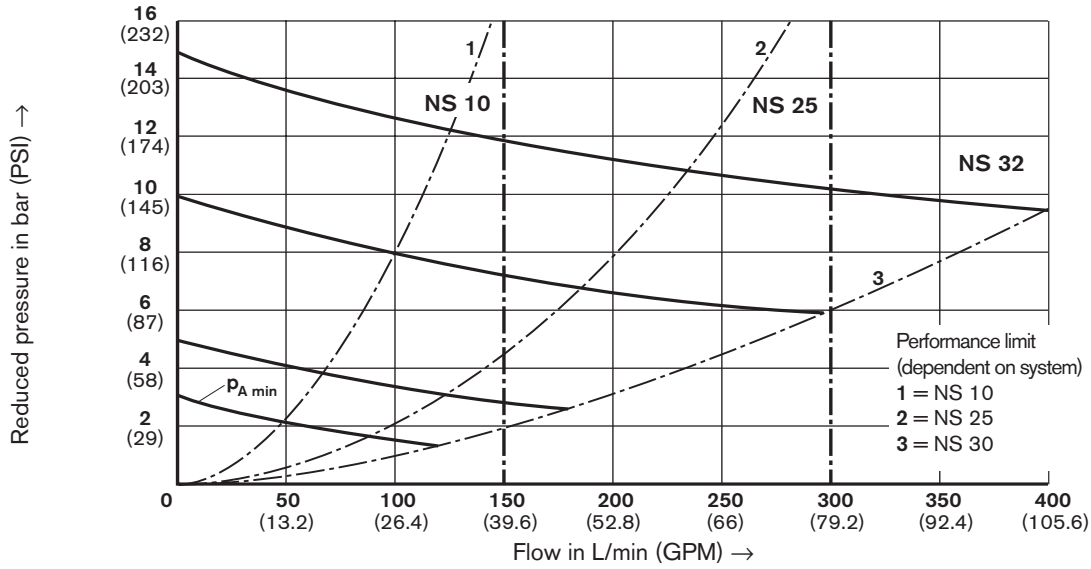
1) 350 bar (5000 PSI) only possible for version **without** check valve
2) Suitable for NBR **and** FKM seals
3) **Only** suitable for FKM seals
4) The cleanliness class stated for the components must be adhered to in hydraulic systems. Effective filtration prevents faults from occurring and at the same time increases the component service life.
For the selection of filters see catalogue sheets RE 50 070, RE 50 076 and RE 50 081.

**Characteristic curves** – measured with HLP46, $\vartheta_{oil} = 40\ °C \pm 5\ °C$ (104 °F ±41 °F)

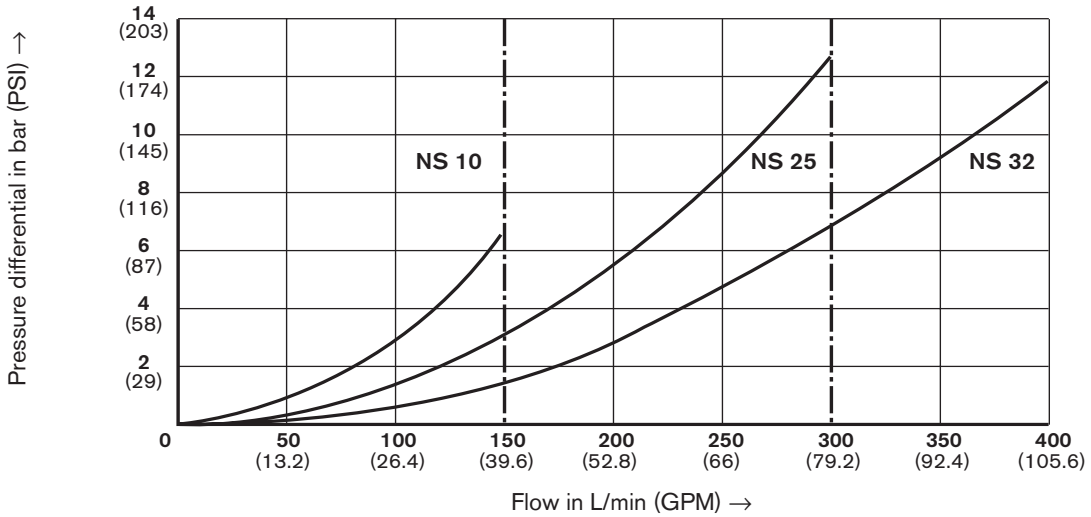
### Outlet pressure $p_A$ in relation to the flow $q_V$ (B to A)




### Minimum settable pressure at $p_{A\ min}$ in relation to the flow $q_V$ (B to A)

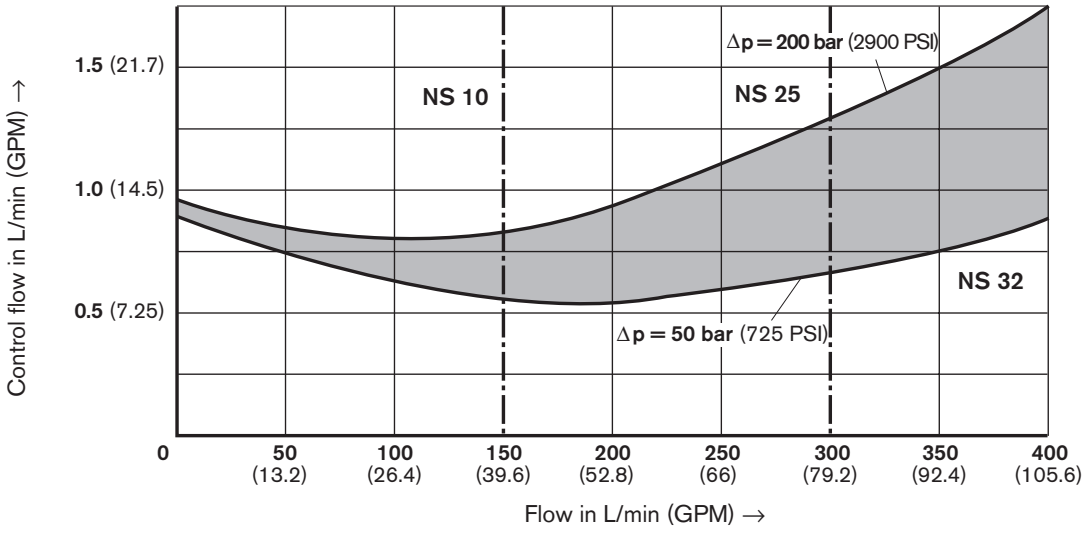



### $\Delta p$-$q_V$-characteristic curves (B to A; lowest settable pressure differential)

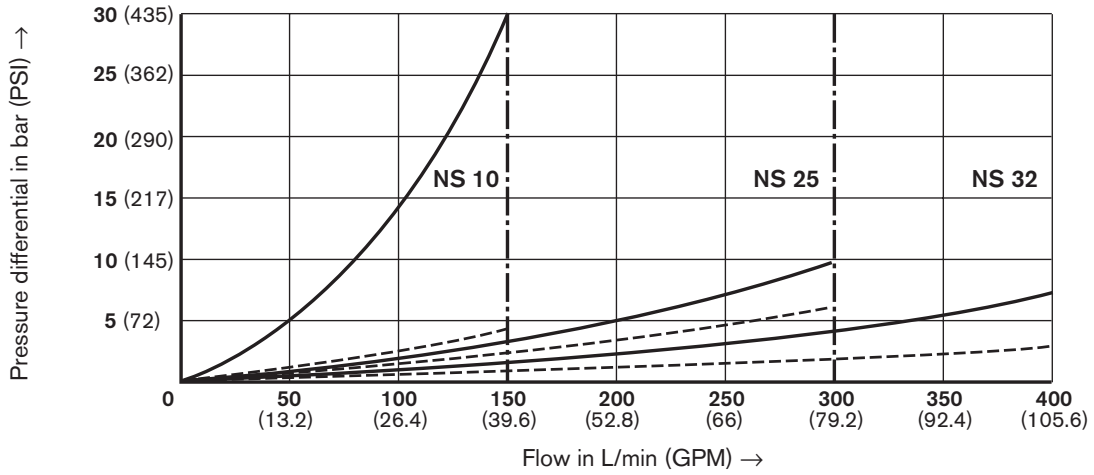


## **Characteristic curves** (measured with HLP46, $\vartheta_{oil}$ = 40 °C ± 5 °C (104 °F ±41 °F)

### Control flow in relation to the flow (B to A) and to the pressure differential



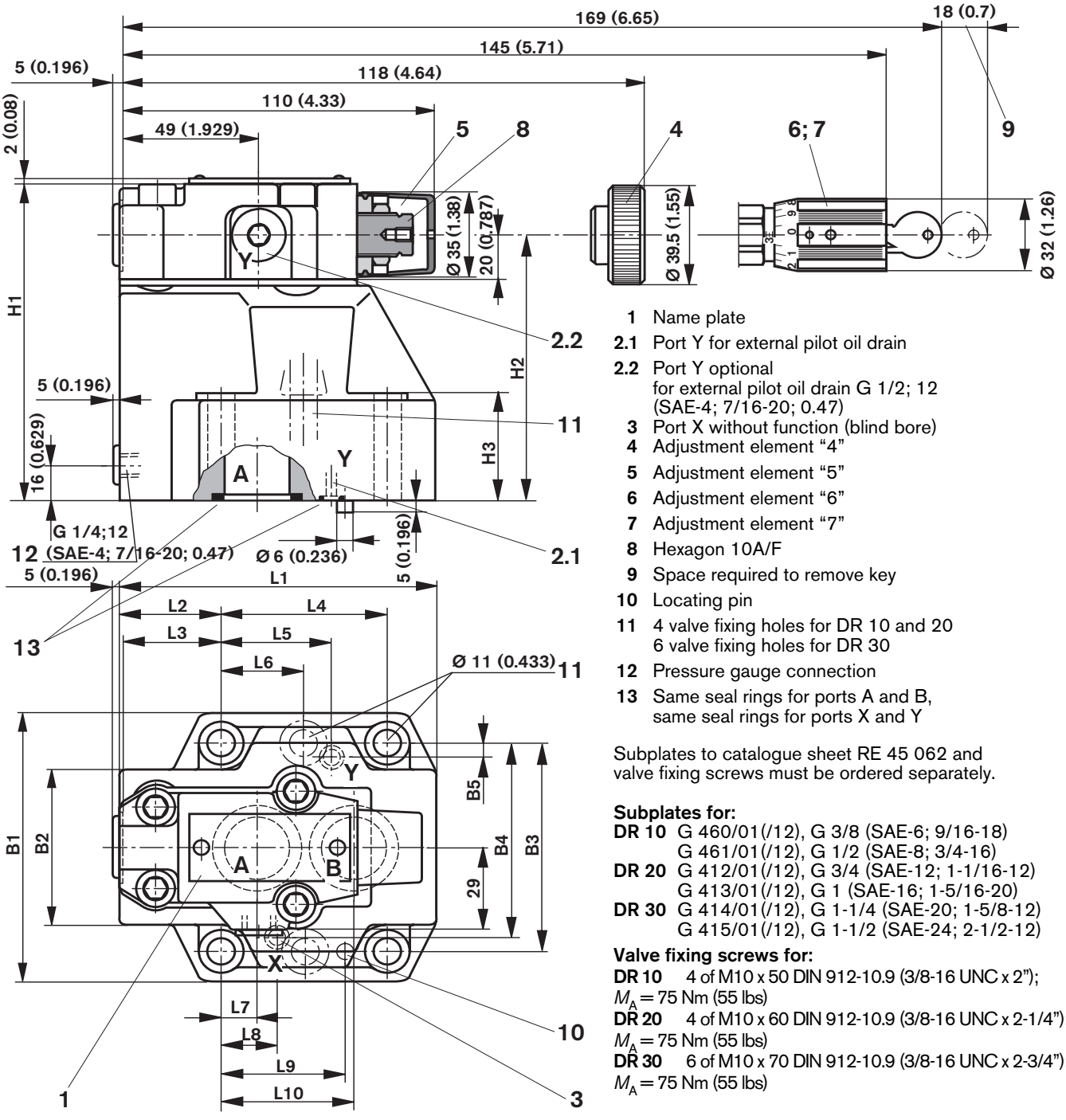

### $\Delta p$-$q_V$-characteristic curves via the check valve (A to B)




——— Flow resistance via check valve, the main stage closed

— — — Flow resistance via check valve with the main stage fully open

## **Unit dimensions: subplate mounting –** dimensions in millimeters (inches)

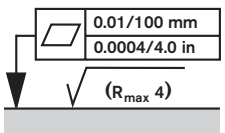



**1** Name plate
**2.1** Port Y for external pilot oil drain
**2.2** Port Y optional
for external pilot oil drain G 1/2; 12 (SAE-4; 7/16-20; 0.47)
**3** Port X without function (blind bore)
**4** Adjustment element “4”
**5** Adjustment element “5”
**6** Adjustment element “6”
**7** Adjustment element “7”
**8** Hexagon 10A/F
**9** Space required to remove key
**10** Locating pin
**11** 4 valve fixing holes for DR 10 and 20
6 valve fixing holes for DR 30
**12** Pressure gauge connection
**13** Same seal rings for ports A and B, same seal rings for ports X and Y

Subplates to catalogue sheet RE 45 062 and valve fixing screws must be ordered separately.

**Subplates for:**
**DR 10** G 460/01(/12), G 3/8 (SAE-6; 9/16-18)
G 461/01(/12), G 1/2 (SAE-8; 3/4-16)
**DR 20** G 412/01(/12), G 3/4 (SAE-12; 1-1/16-12)
G 413/01(/12), G 1 (SAE-16; 1-5/16-20)
**DR 30** G 414/01(/12), G 1-1/4 (SAE-20; 1-5/8-12)
G 415/01(/12), G 1-1/2 (SAE-24; 2-1/2-12)

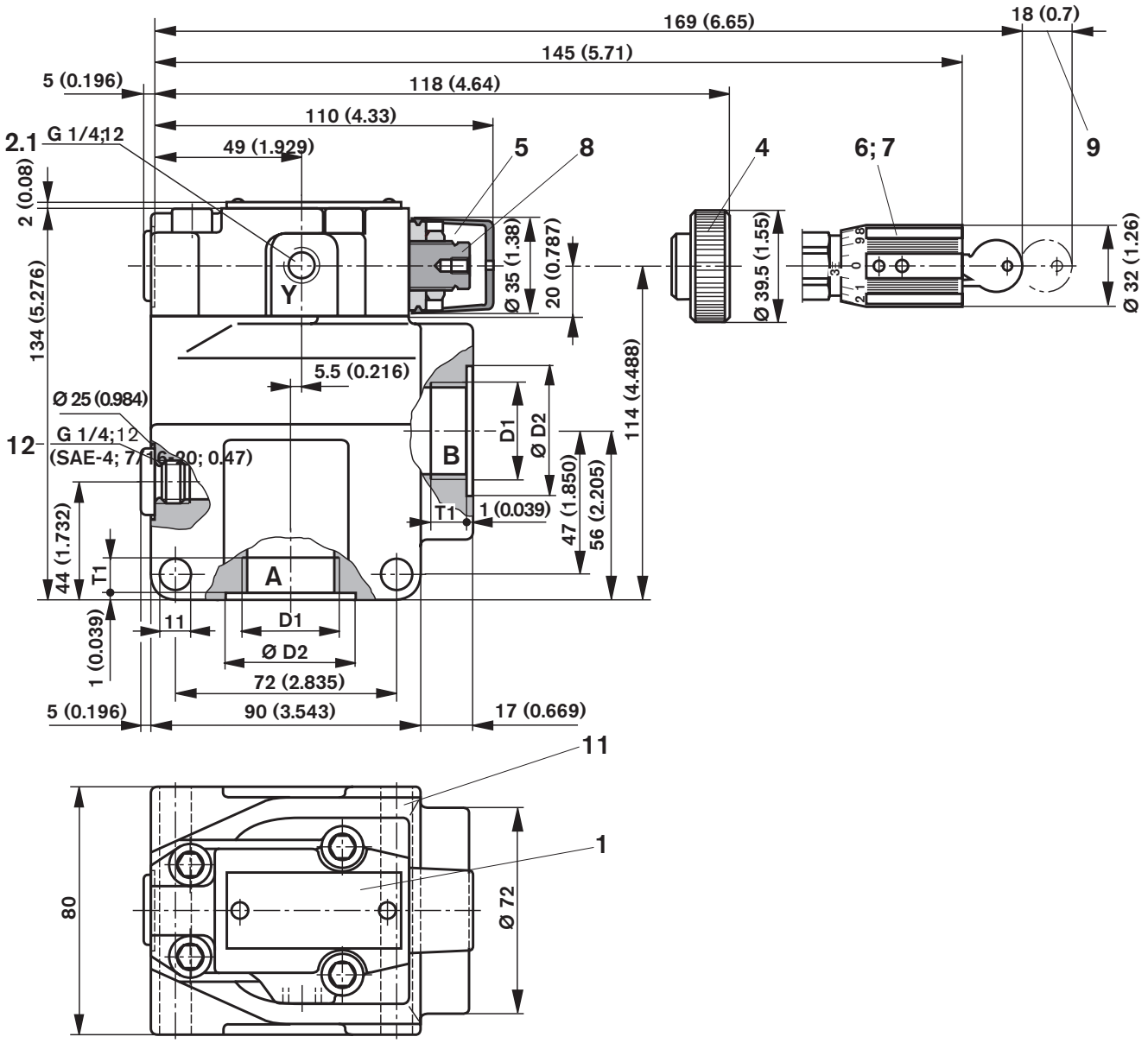
**Valve fixing screws for:**
**DR 10** 4 of M10 x 50 DIN 912-10.9 (3/8-16 UNC x 2”); $M_A$ = 75 Nm (55 lbs)
**DR 20** 4 of M10 x 60 DIN 912-10.9 (3/8-16 UNC x 2-1/4”); $M_A$ = 75 Nm (55 lbs)
**DR 30** 6 of M10 x 70 DIN 912-10.9 (3/8-16 UNC x 2-3/4”); $M_A$ = 75 Nm (55 lbs)




Required surface finish of mating piece

| Type | L1 | L2 | L3 | L4 | L5 | L6 | L7 | L8 | L9 | L10 | B1 | B2 | B3 | B4 | B5 | H1 | H2 | H3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DR 10** | 96 (3.78) | 35.5 (1.40) | 33 (1.30) | 42.9 (1.69) | 21.5 (0.85) | – | 7.2 (0.28) | 21.5 (0.85) | 31.8 (1.25) | 35.8 (1.41) | 85 (3.35) | 50 (1.97) | 66.7 (2.63) | 58.8 (2.32) | 7.9 (0.31) | 112 (4.41) | 92 (3.62) | 28 (1.10) |
| **DR 20** | 116 (4.57) | 37.5 (1.48) | 35.4 (1.39) | 60.3 (2.37) | 39.7 (1.56) | – | 11.1 (0.44) | 20.6 (0.81) | 44.5 (1.75) | 49.2 (1.93) | 102 (4.02) | 59.5 (2.34) | 79.4 (3.13) | 73.0 (2.87) | 6.4 (0.25) | 122 (4.80) | 102 (4.02) | 38 (1.50) |
| **DR 30** | 145 (5.71) | 33 (1.30) | 29.8 (1.17) | 84.2 (3.32) | 59.5 (2.34) | 42.1 (1.65) | 16.7 (0.66) | 24.6 (0.97) | 62.7 (2.47) | 67.5 (2.66) | 120 (4.72) | 76 (2.99) | 96.8 (3.81) | 92.8 (3.65) | 3.8 (0.15) | 130 (5.12) | 110 (4.33) | 46 (1.81) |

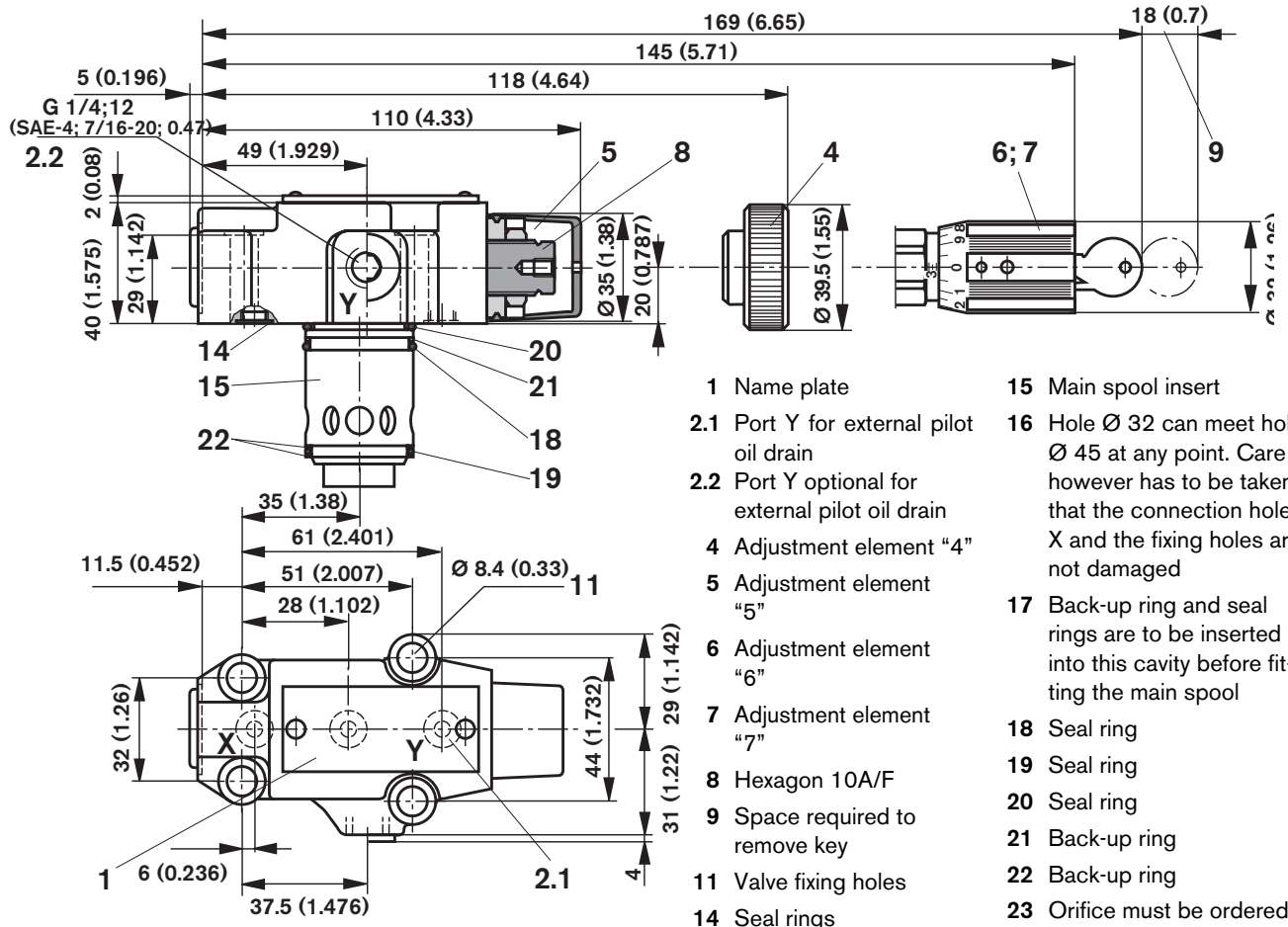
**Unit dimensions: threaded connections** – dimensions in millimeters (inches)




**1** Name plate
**2.1** Port Y for external pilot oil drain
**4** Adjustment element “4”
**5** Adjustment element “5”
**6** Adjustment element “6”
**7** Adjustment element “7”
**8** Hexagon 10A/F
**9** Space required to remove key
**11** Valve fixing hole
**12** Pressure gauge connection

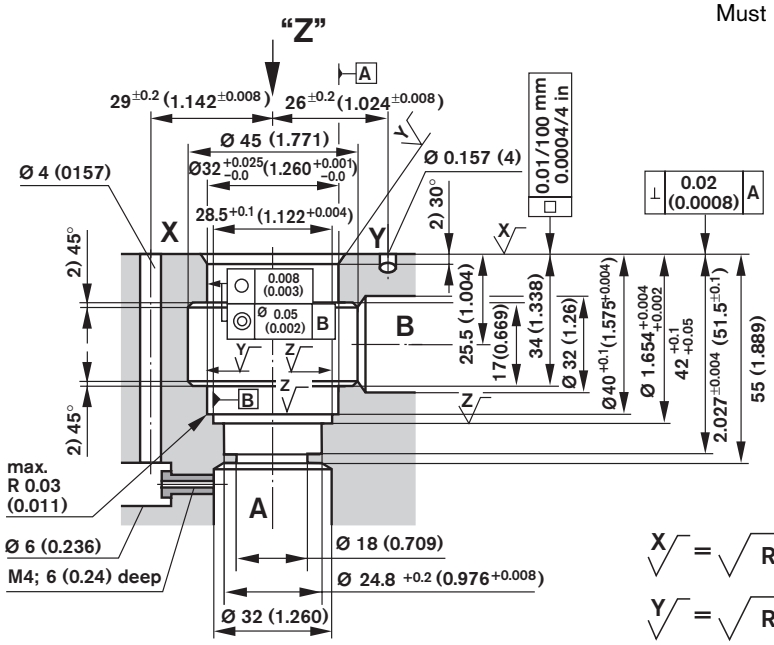
| Type | D1 | ØD2 | T1 |
|---|---|---|---|
| **DR 10 G** | G 1/2 (SAE-8; 3/4-16) | 34 | 14 |
| **DR 15 G** | G 3/4 (SAE-12; 1-1/16-12) | 42 | 16 |
| **DR 20 G** | G 1 (SAE-16; 1-5/16-20) | 47 | 18 |
| **DR 25 G** | G 1-1/4 (SAE-20; 1-5/8-12) | 58 | 20 |
| **DR 30 G** | G 1-1/2 (SAE-24; 1-7/8-12) | 65 | 22 |

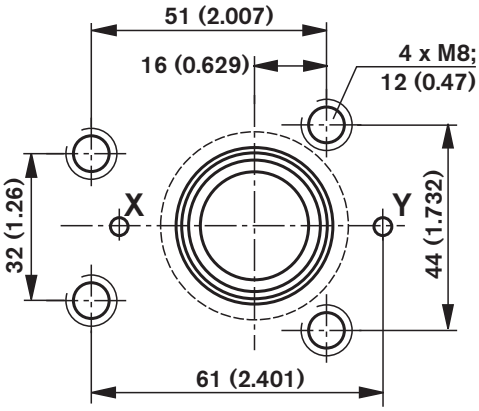
## Unit dimensions: pilot valve with (DRC 30) or without (DRC) main spool insert – dimensions in mm (inches)




**1** Name plate
**2.1** Port Y for external pilot oil drain
**2.2** Port Y optional for external pilot oil drain
**4** Adjustment element “4”
**5** Adjustment element “5”
**6** Adjustment element “6”
**7** Adjustment element “7”
**8** Hexagon 10A/F
**9** Space required to remove key
**11** Valve fixing holes
**14** Seal rings
**15** Main spool insert
**16** Hole Ø 32 can meet hole Ø 45 at any point. Care however has to be taken that the connection hole X and the fixing holes are not damaged
**17** Back-up ring and seal rings are to be inserted into this cavity before fitting the main spool
**18** Seal ring
**19** Seal ring
**20** Seal ring
**21** Back-up ring
**22** Back-up ring
**23** Orifice must be ordered separately

4 of **valve fixing screws** M8 x 40 DIN 912-10.9 (5/16-18 UNC x 1-1/2“), $M_A$ = 37 Nm (27.3 lb-ft)
Must be ordered separately




$\sqrt{X} = \sqrt{R_{max}4}$

$\sqrt{Y} = \sqrt{R_z8}$

$\sqrt{Z} = \sqrt{R_z16}$

## Notes

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