

MANNESMANN REXROTH	Direct Operated Load Dependent Backpressure Valve Type DZ 6 DP../..W2, Series 5X			RE 26 080/04.93
	Size 6	up to 40 L/min	up to 200 bar	Ersetzt: 01.90

- for subplate mounting:
mounting pattern to DIN 24 340, Form A,
ISO 4401 and CETOP–RP 121 H,
subplate to catalogue sheet RE 45 052
(to be ordered separately)
- 3 pressure ratings
- 4 different adjustment elements:
 - Rotary knob
 - Grub screw with hexagon and protective cap
 - Lockable rotary knob with scale
 - Rotary knob with scale
- for cylinder area ratios from 1 : 1 to 1 : 2
- optional check valve



K 4520–14
DZ 6 DP 2– 5X/..W2

Ordering Code

DZ 6 DP	– 5X /	W2	*
Load dependent backpressure valve, Size 6			Further details in clear text
Adjustment elements			
Rotary knob	= 1		no code = NBR seals, suitable for mineral oils (HL, HLP) to DIN 51 524
Grub screw with hexagon and protective cap	= 2		V = FPM seals, suitable for phosphate ester (HFD-R)
Lockable rotary knob with scale	= 3		
Rotary knob with scale	= 7		
Series 50 to 59 (Series 50 to 59: installation and connection dimensions remain the same)	= 5X		no code = with check valve
Pressure rating 20 bar	= 20		M = without check valve
Pressure rating 40 bar	= 40		X = external pilot oil supply, internal drain oil
Pressure rating 60 bar	= 60		XY = external pilot oil supply, external drain oil

Fixed pressure rating 20 bar (40, 60 bar) means:
max. pressure p_x 20 bar (40, 60 bar), if $A_2/A_1 = 1/2$, $Q \sim 0$ and $F = 0$

Technical Data (For applications outside these parameters, please consult us!)

Fluid	Mineral oils to DIN 51 524 (HL, HLP) Phosphate ester (HFD-R)		
Fluid temperature range	°C	– 30 up to + 80	
for NBR seals	°C	– 20 up to + 80	
for FPM seals			
Viscosity range	mm ² /s	10 up to 800	
Degree of contamination	Max. permissible degree of contamination of fluid to NAS 1638 class 9. We therefore recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$.		
Pressure range	bar	20	40
Operating pressure			60
– Port P	bar	up to 60	up to 120
– Port X	bar	up to 50	up to 105
– Port Y	bar	up to 5	
– Port A, (Flow P–A)	bar	up to 5	
– Port A, (Flow A–P) (via check valve)	bar	up to 200	
Flow, max. permissible	L/min	up to 40	
Weight	kg	approx. 1,5	

Functional Description, Section, Symbols

Load dependent backpressure valves type DZ6DP..-5X/..W2 are used mainly for controlling the hydraulic feeds of machine tool slides.

They basically consist of housing (1), spool (2), rating spool (3), adjustment element (4) with pressure spring (5) and optional check valve (6).

A flow of oil, independent of load, is fed to the cylinder (11) in the feed via the flow control valve (10). The backpressure force ($p_p \cdot A_2$) is created by means of the load dependent backpressure valve. Pressure p_p affects the annulus area (16) and pressure p_x the face (17) of the rating piston (3). The force resulting from pressures p_p and p_x works against the pressure spring (5) and opens the passage from port P to A.

If desired, a check valve (6) can be fitted for free return flow from A to P.

High Degree of Efficiency

At maximum external force $+F$ (e.g. boring in solid material) pressure p_x increases, while pressure p_p automatically sinks accordingly (see performance curves pages 5, 6 and 7).

The backpressure ($p_p \cdot A_2$) is thus low at maximum external force. Drive force ($p_x \cdot A_1$) is thus available mainly for machining.

This results in a high degree of total efficiency at maximum external force $+F$.

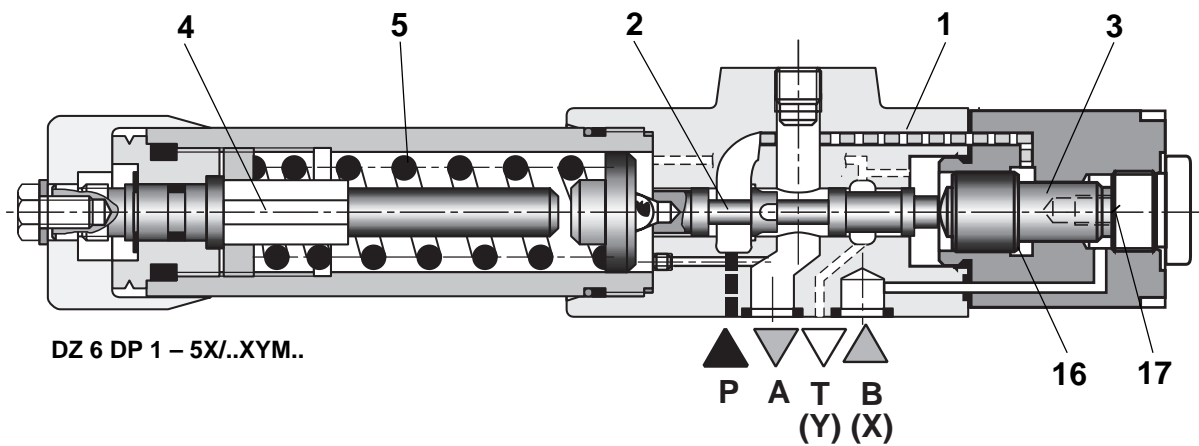
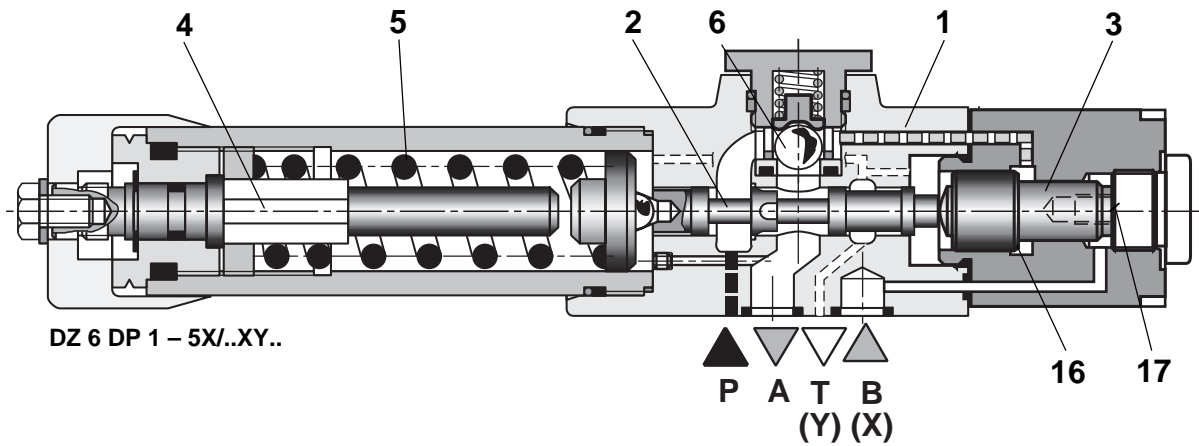
High Backpressure Force

If the external force changes from $+F$ to $-F$, pressure p_x decreases, while p_p automatically increases accordingly (see performance curves pages 5, 6 and 7).

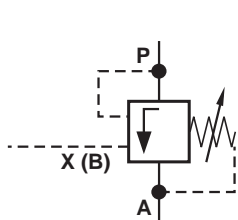
This results in a high backpressure force ($p_p \cdot A_2$) if external force F changes from plus to minus.

Wide Range of Application

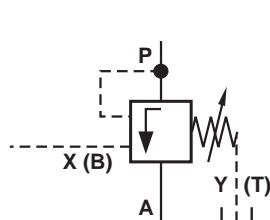
The load dependent backpressure valve can be used on cylinders with area ratios $\frac{A_2}{A_1} = \frac{1}{1}$ to $\frac{1}{2}$



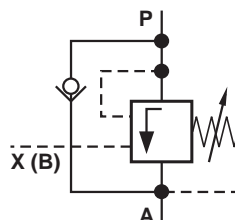
Model "XM..W2"



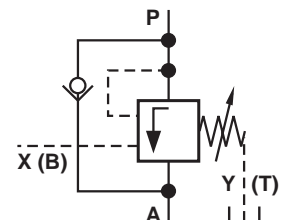
Model "XYM..W2"



Model "X..W2"

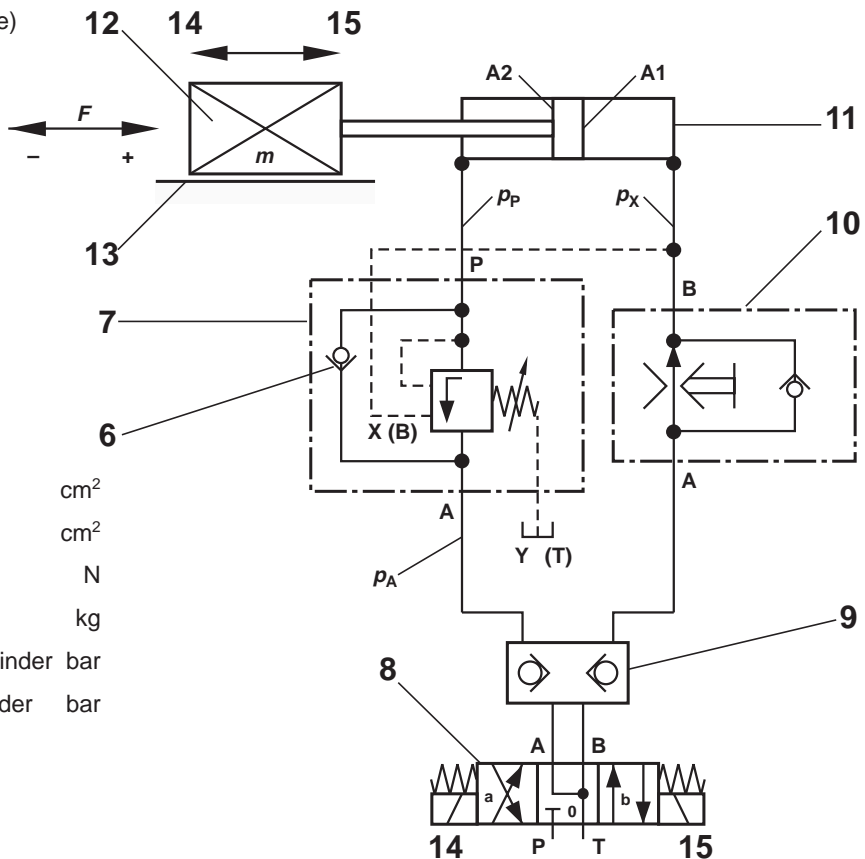


Model "XY..W2"



Typical Circuit with a Load Dependent Backpressure Valve

- 6 Check valve (built in backpressure valve)
- 7 Load dependent backpressure valve
- 8 Directional control valve
- 9 Double check valve
- 10 Flow control valve
- 11 Cylinder (at rest)
- 12 Machine tool slide
- 13 Slide guide
- 14 Feed (forwards)
- 15 No load (backwards)

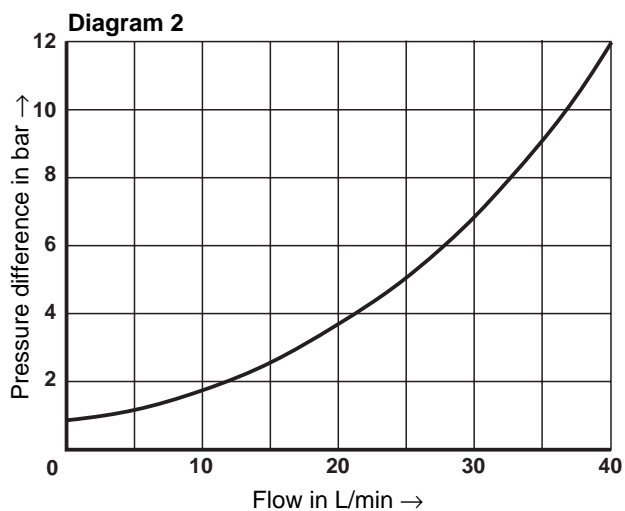
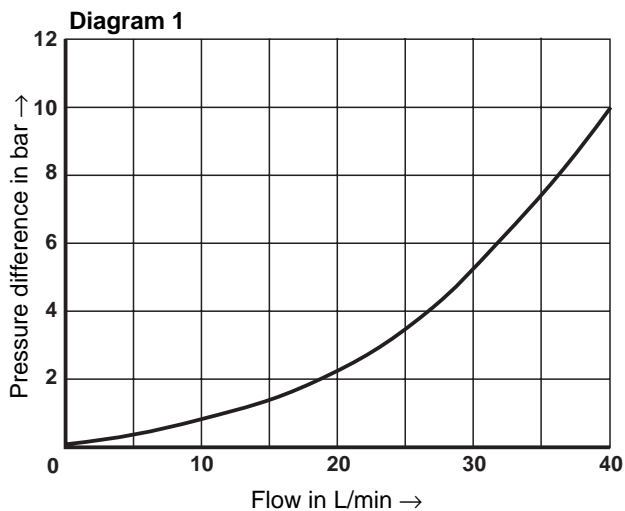


A1 = Cylinder piston area cm²
 A2 = Cylinder piston rod area cm²
 ±F = External force (e.g. machining) N
 m = Weight of machine tool slide kg
 p_P = Pressure of fluid draining from the cylinder bar
 p_X = Pressure of fluid flowing into the cylinder bar

Operating Curves (measured at $v = 41 \text{ mm}^2/\text{s}$ and $t = 50 \text{ }^\circ\text{C}$)

Pressure difference related to flow measured from P to A with fully opened valve

Pressure difference related to flow measured from A to P via check valve



Operating Curves (measured at $v = 41 \text{ mm}^2/\text{s}$ and $t = 50 \text{ }^\circ\text{C}$): Diagrams 3, 4 and 5

The diagrams 3, 4 and 5 show the pressure/flow dependency with pressure p_x as parameter. The operating curves apply to the max. spring setting at the valve.

(p_x does not exist as constant value: the diagrams 3, 4 and 5 are shows as additional explanation of diagrams 6, 7 and 8.)

In **practical application** the pressures p_p and p_x change according to operating curves 6, 7 and 8 with constant flow. With external force $F = 0$ the resulting pressures lie on curves I or II.

With $F \neq 0$ the resulting pressures change on operating curves 1, 2, 3 according to plus or minus of F . These curves correspond to the max. spring setting of the pressure rating.

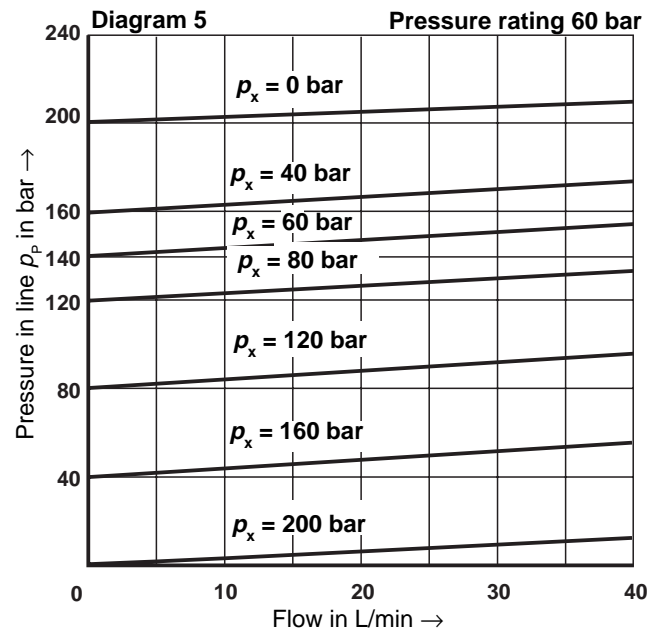
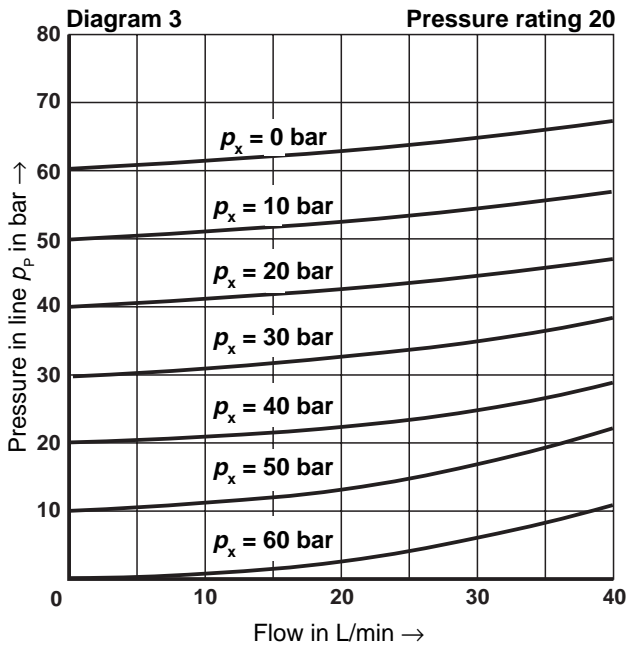
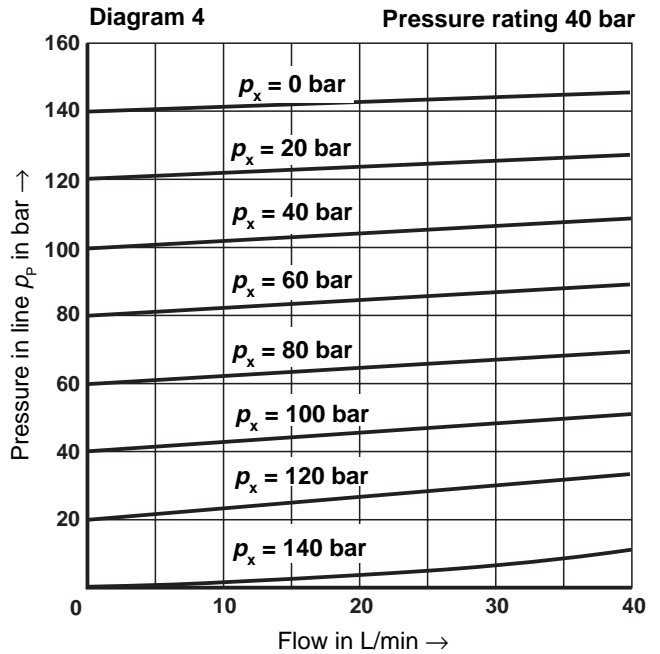
The fixing of the pressure rate result from max. spring setting and $F = 0, Q \approx 0, A2 : A1 = 1 : 2$.

The operating curves in the diagrams 6 to 8 are lines based on same spring setting at the valve.

The change of e.g. the operating curve in the diagrams 7 and 8 compared to diagram 6 results in the change of flow from P to A from $Q \sim 0$ up to 40 L/min. Thus the pressure/flow dependency is seen in diagrams 1 and 2.

Curves $p_p = f(p_x)$ have been drawn at pressure of $p \leq 5 \text{ bar}$ at valve ports A and Y(T).

A minimum pressure of 5 bar in p_x is necessary for perfect control by means of the flow control valve item 10, page 2.



Operating Curves (measured at $v = 41 \text{ mm}^2/\text{s}$ and $t = 50 \text{ }^\circ\text{C}$): Diagrams 6, 7 and 8

Valve Adjustment

The valve is adjusted at $F = 0$. The resulting pressures p_x and p_p lie on curves I or II, depending on the cylinder area ratio $A2 : A1$.

Friction and Weight

Curves I and II for pressures p_x and p_p (with external force $F = 0$, no machining and cylinder area ratios $A2 : A1 = 1 : 1$ or $1 : 2$) do not take into account the pressures required to overcome the friction forces in the slide guides and in the cylinder. These lines also pre-suppose an evenly balanced weight (m) of machine slide.

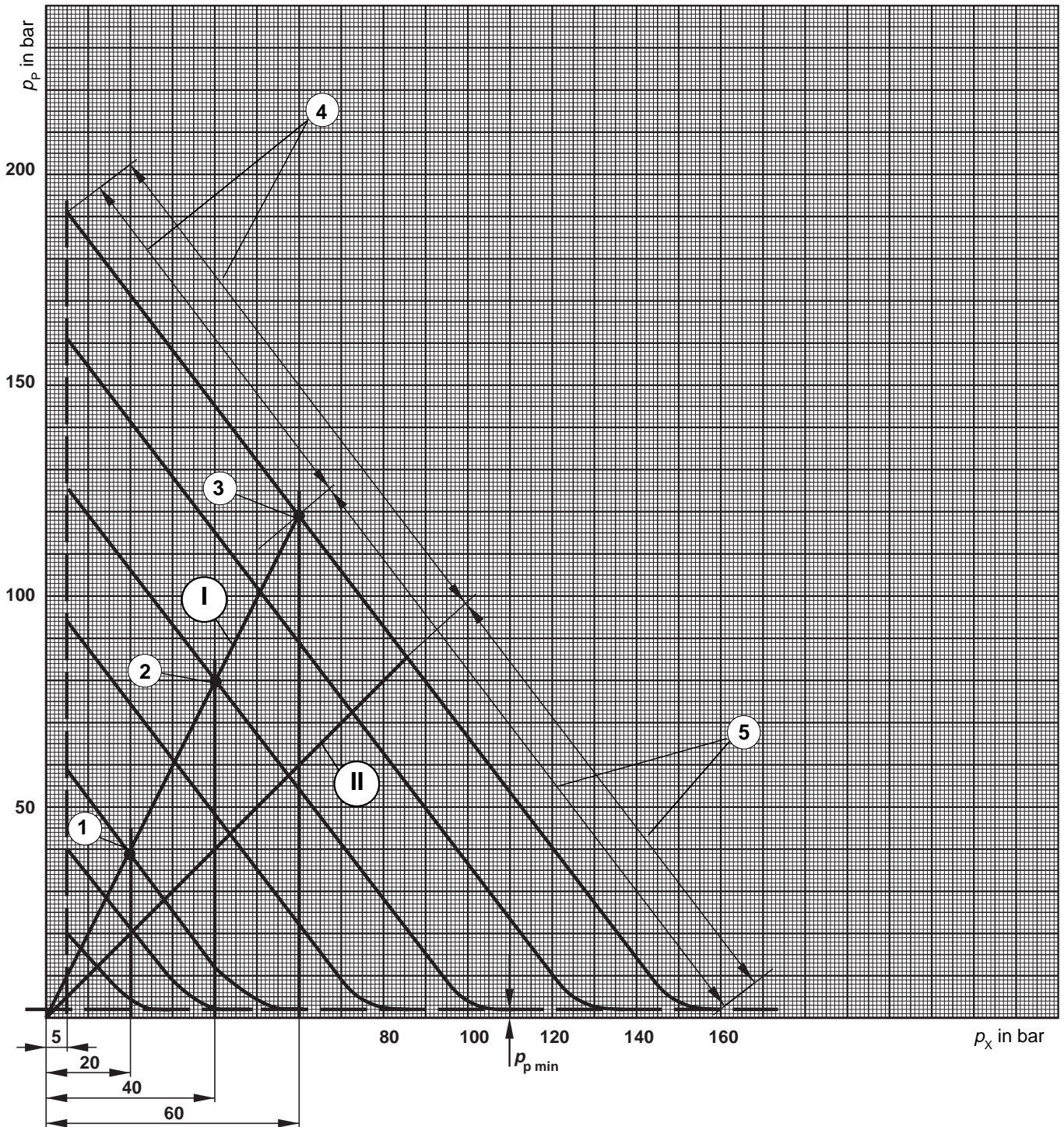
If these values are changed (friction $\neq 0$ and weight not balanced out), the resulting pressures p_x and p_p at $F = 0$ lie on the curves below or above lines I and II.

External Force F

Depending on the change of the external force F towards plus or minus, pressures p_x and p_p change according to the curves 6, 7 and 8.

Operating Curves (measured at $\nu = 41 \text{ mm}^2/\text{s}$ and $t = 50 \text{ }^\circ\text{C}$): Diagram 6; $Q = 0 \text{ L/min}$

Diagram 6



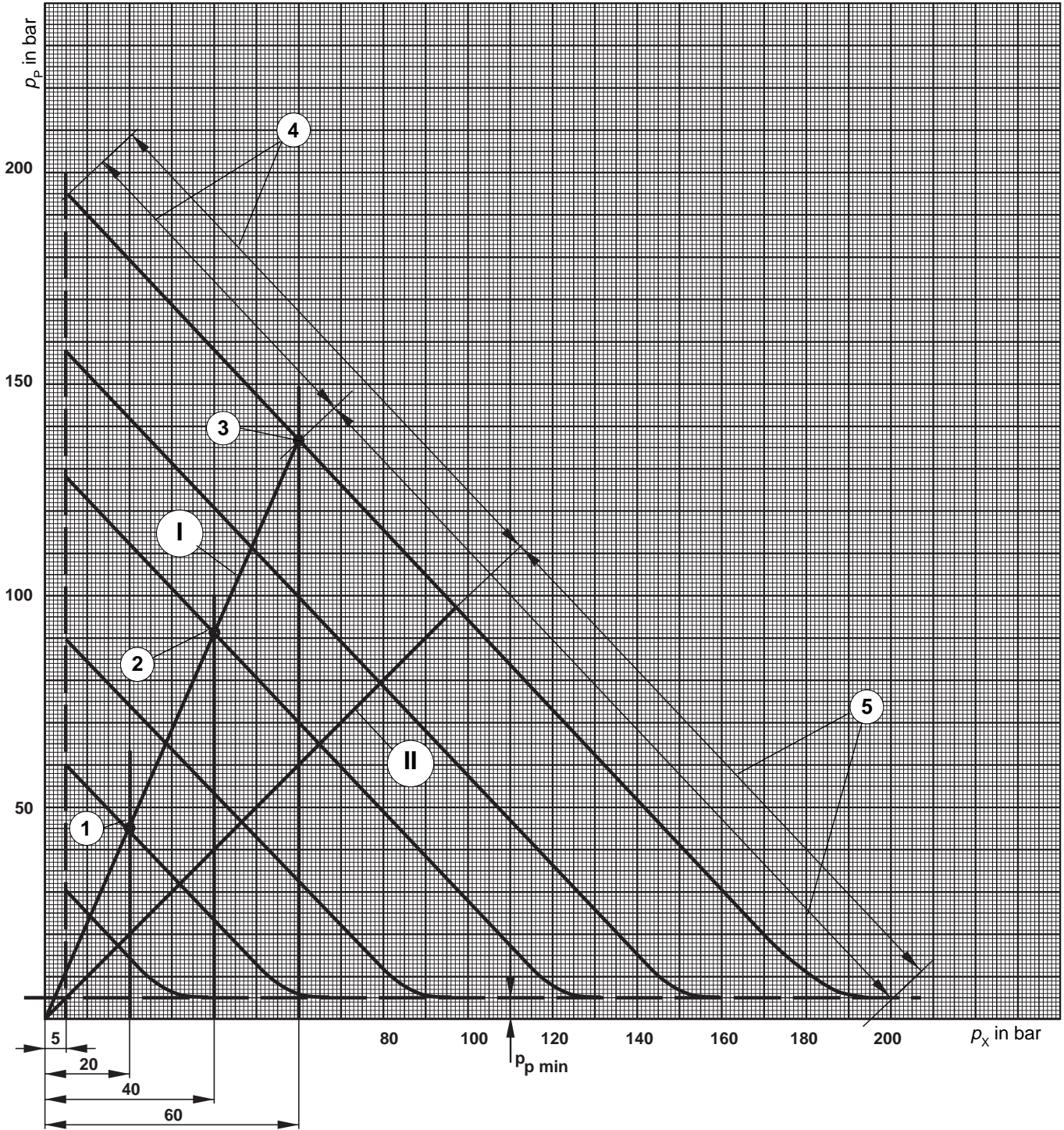
- 1 Pressure rating, fixed to 20 bar
- 2 Pressure rating, fixed to 40 bar
- 3 Pressure rating, fixed to 60 bar
- 4 Pressures for $(-F)$
- 5 Pressures for $(+F)$

$p_{p \text{ min}} = \Delta p_v + p_A$
 Δp_v see diagram 1
 p_A Pressure at port A
 (system dependent)
 see example page 2

I Line for $F = 0$ at $\frac{A_2}{A_1} = \frac{1}{2}$
 II Line for $F = 0$ at $\frac{A_2}{A_1} = \frac{1}{1}$

Operating Curves (measured at $\nu = 41 \text{ mm}^2/\text{s}$ and $t = 50 \text{ }^\circ\text{C}$): Diagram 7; $Q = 20 \text{ L/min}$

Diagram 7



$p_{p \text{ min}} = \Delta p_v + p_A$
 Δp_v see diagram 1
 p_A Pressure at port A
 (system dependent)
 see example page 2

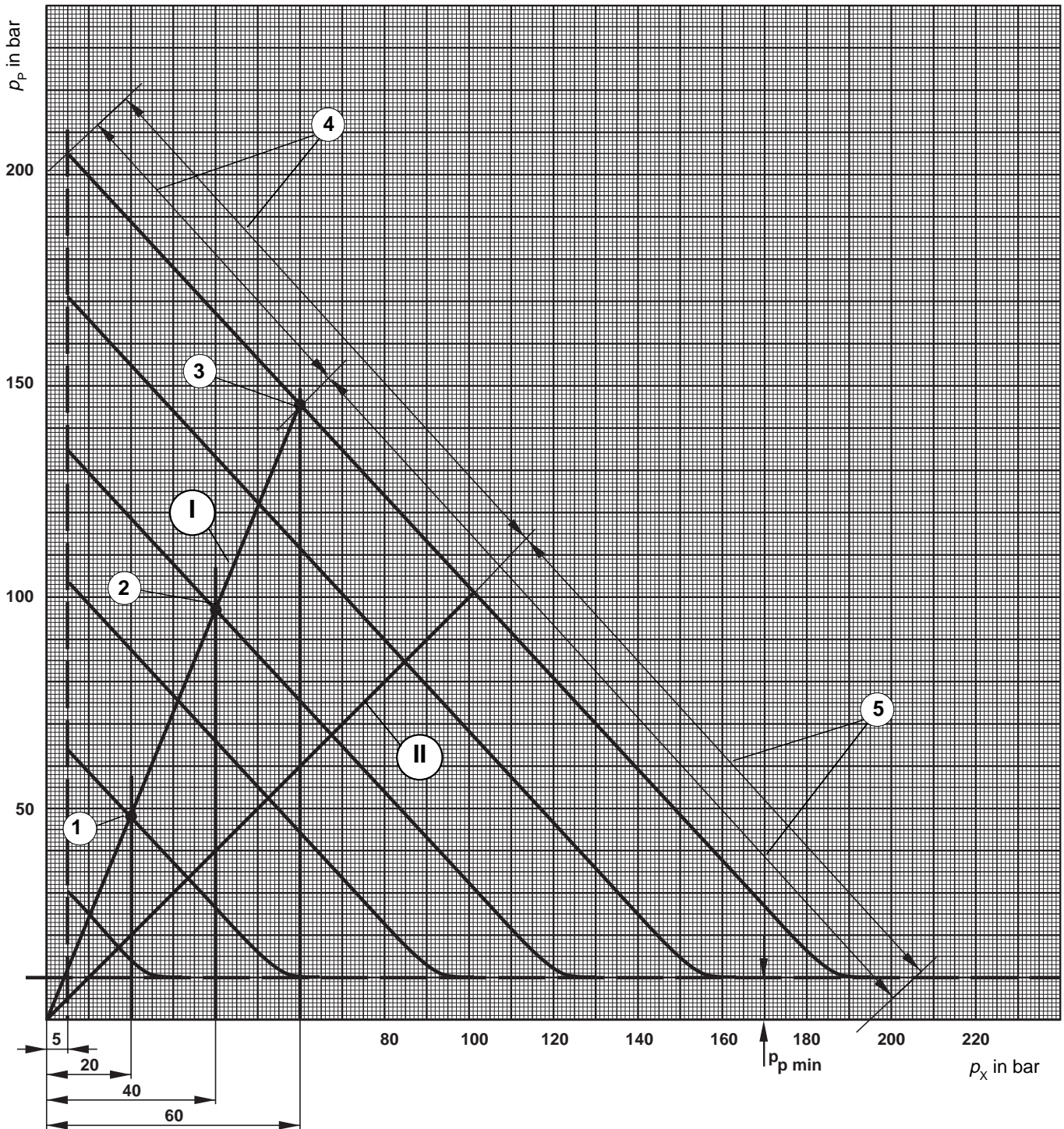
- 1 Pressure rating, fixed to 20 bar
- 2 Pressure rating, fixed to 40 bar
- 3 Pressure rating, fixed to 60 bar
- 4 Pressures for (-F)
- 5 Pressures for (+F)

I Line for $F = 0$ at $\frac{A2}{A1} = \frac{1}{2}$

II Line for $F = 0$ at $\frac{A2}{A1} = \frac{1}{1}$

Operating Curves (measured at $v = 41 \text{ mm}^2/\text{s}$ and $t = 50 \text{ }^\circ\text{C}$): Diagram 8; $Q = 40 \text{ L/min}$

Diagram 8



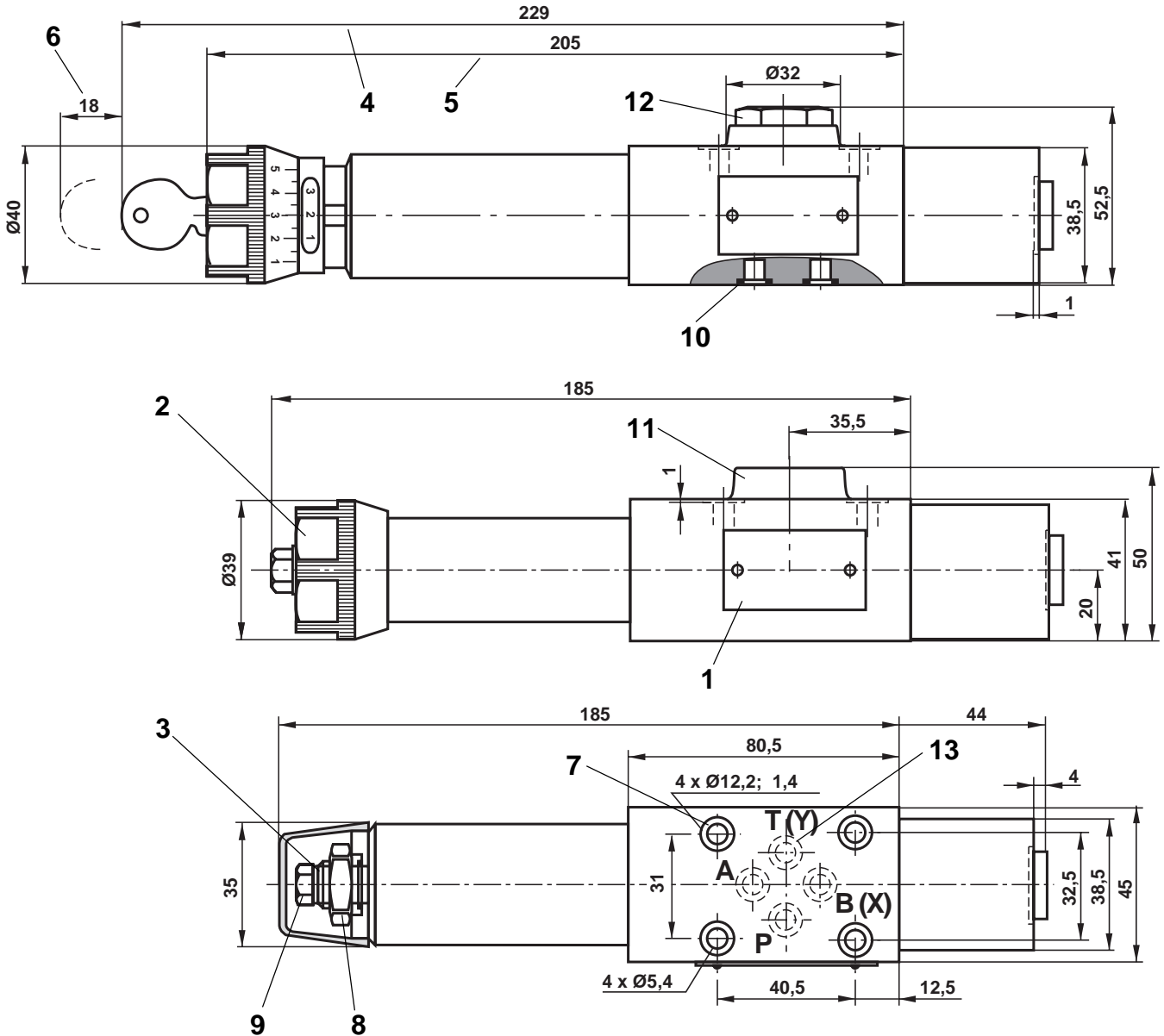
$p_{P \text{ min}} = \Delta p_V + p_A$
 Δp_V see diagram 1
 p_A Pressure at port A
 (system dependent)
 see example page 2

- 1 Pressure rating, fixed to 20 bar
- 2 Pressure rating, fixed to 40 bar
- 3 Pressure rating, fixed to 60 bar
- 4 Pressures for $(-F)$
- 5 Pressures for $(+F)$

I Line for $F = 0$ at $\frac{A_2}{A_1} = \frac{1}{2}$
 II Line for $F = 0$ at $\frac{A_2}{A_1} = \frac{1}{1}$

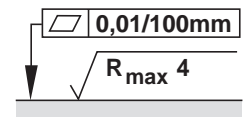
Unit Dimensions

(Dimensions in mm)



BSP pipe thread to ISO 228/1

Required surface finish of mating piece



- 1 Nameplate
- 2 Adjustment element "1"
- 3 Adjustment element "2"
- 4 Adjustment element "3"
- 5 Adjustment element "7"
- 6 Space required for removal of key
- 7 Valve fixing holes
- 8 Locknut 24 A/F
- 9 Hexagon 10 A/F
- 10 R-rings 9,81 x 1,5 x 1,78 for ports A, B(X), P, T(Y)
- 11 without check valve
- 12 with check valve
- 13 Model DZ 6 DP..-5X/.. X..W2
Port T in the subplate must be plugged if this valve model is fitted on a subplate.
If this model is fitted on a control block there must be no connection to port T.

Subplates

- G 341/01 (1/4" BSP)
- G 342/01 (3/8" BSP)
- G 502/01 (1/2" BSP)

Subplates to catalogue sheet RE 45 052 and **valve fixing screws** M5 x 50 DIN 912 - 10.9; tightening torque = 8,9 Nm must be ordered separately.



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