Pressure reducing valves type ADM

Non-piloted, for hydraulic systems

Operation pressure p_{max} P = 315 bar
p_{max} A = 250 bar
Flow Q_{max} = 60 lpm

1. General information

Pressure reducing valves are pressure valves. Their task is to keep the outlet pressure constant, despite a higher and changing inlet pressure (ISO 1219-1).
They are used in hydraulic systems where a second oil circuit with a lower pressure level (secondary circuit) is to be branched from an oil circuit with a higher pressure level (primary circuit), without the affecting the higher pressure in the primary circuit.

2. Available versions, main data

Order example: **ADM 22 D R - 110**

Desired pressure setting (bar) [2]

Table 1: Basic type, size

Connection	Coding	Flow P→A Q_{max} (lpm)	Port size ISO 228/1 (BSPP) P u. A	L	Mass (weight) (kg)
Pipe connection	**ADM 11**	12	G 1/4	G 1/4	0.6
	ADM 21	25	G 1/4		0.7
	ADM 22	25	G 3/8		0.7
	ADM 32	60	G 3/8		1.0
	ADM 33	60	G 1/2		1.0
Manifold mounting	**ADM 11 P**	12	See dimensional drawings in section 4		0.6
	ADM 22 P	25			0.9
	ADM 33 P	60			1.1

Table 2: Pressure range for outlet A

Coding	Pressure range (bar) adjustable from $p_{A\,min}$ to $p_{A\,max}$ ADM 11	ADM 2..	ADM 3..
A	160 ... 250	160 ... 250	130 ... 250
C	60 ... 160	45 ... 160	30 ... 160
D	30 ... 120	30 ... 120	25 ... 100
F	10 [1]... 50	10 [1]... 30	15 [1]... 25

The pressure figures apply to $Q_{P\rightarrow A}$ = 0 lpm, i.e. the consumer has achieved its end position and doesn't move any further (static pressure). See also p_A - $Q_{P\rightarrow A}$ curves!

Table 3: Means of adjustment during operation

Coding	Description	Symbols
without	Standard, tool adjustable	Standard
R	Manually adjustable (Wing screw + wing nut)	R and V
V	Turn knob (self locking)	
H	Turn knob with lock (Keys conforming the standards of the automotive industry; The key is scope of delivery but also in possession of the authorized maintenance staff)	H
T	Pin (with light alloy spring dome), only available for ADM(P) 11 Note: Pressure must not exceed 20 bar at L and therefore should be routed separately to the tank!	T and TS
TS	Pin (with steel spring dome), only available for ADM(P) 11 Note: For applications where the pressure exceeds 20 bar at L	

[1] Flow should not exceed 40% of Q_{max}

[2] The valve will be set to its max pressure, when the pressure specificatien is missing.

3. Additional parameter

Nomenclature, design

Directly controlled pressure reducing valve with overdrive compensation, spool valve design.
Overdrive compensation means, that the valve will act like a pressure limiting valve (while in control position) as soon as the secondary pressure exceeds the apparent pressure on the inlet side, e.g. external forces acting on the consumer. (see p_A-$Q_{P\rightarrow A}$ curve).

Material

Valve body gasnitrided steel, bore diamond honed, controller piston made of stainless steel, hardened and ground. Bore and piston polish deburred. The hardened and ground valve spools are polished/ deburred. This preserves their roundness and exact geometric shape making the spool's control edges insensitive to erosion and cavitation induced by the flowing fluid. The gasnitrided housing surface is highly corrosion inhibiting and features a good surface for primers and customer furnished painting. Spring dome made of zinc pressure die-casting.

Pipe connection

Via male pipe fittings shape B conforming DIN 3852 page 2 (BSPP)
For manifold mounting versions, see sect. 4.2
P = Pump (inlet)
A = Consumer
L = Leakage drain; should be routed separately to the tank, see also "Operation pressure".
The cutting edge of the pipe fitting is much more strained due to the increased surface hardness. Therefore it is recommended to replace the fitting whenever removed, thus preventing possible leakage there.

Installed position

Any

Flow direction

P→A (working direction)
A→P (return) only permissible for low flow i.e. less than 50% of Q_{max}
When the return flow could exceed this figure or viscosity > 150 mm²/s a by-pass check valve should be installed (see Δp-Q curve)!
A→L (overdrive) is possible up to 25 ... 30% of Q_{max} with ADM 3..
up to 50 ... 60% of Q_{max} with ADM 11 and ADM 2..

Operation pressure

Inlet P: p_{max} P = 315 bar, for $p_p < p_A$ - set pressure at A = pressure at P.
Leakage drain L must not exceed 20 bar. The pressure apparent at L is to be added at A (set pressure will rise).

Pressure fluid

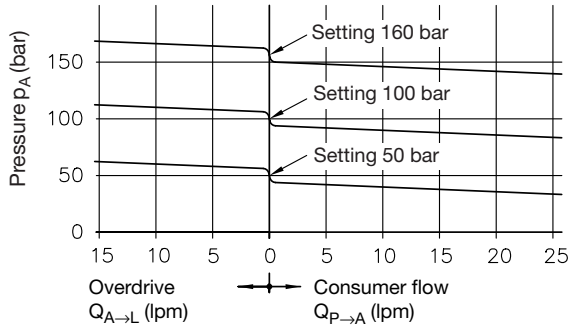
Hydraulic oil conforming DIN 51514 part 1 to 3: ISO VG 10 to 68 conform. DIN 51519.
Viscosity range: min. approx. 4; max. approx. 1500 mm²/s
opt. service: approx. 10 ... 500 mm²/s
Also suitable are biologically degradable pressure fluids (Standards of VDMA 24568 and VDMA 24569) type HEES (Synth. Ester) at service temperatures up to approx. +70 °C.

Temperature

Ambient: approx. -40 ... +80°C
Fluid: -25 ... +80°C; Note the viscosity range !
Permissible temperature during start: -40°C (observe start-viscosity!), as long as the service temperature is at least 20K higher for the following operation.
Biologically degradable pressure fluids: Observe manufacturer's specifications, but not higher than +70°C because of scal material compatibility.

p_A - $Q_{P\rightarrow A}$ - curves

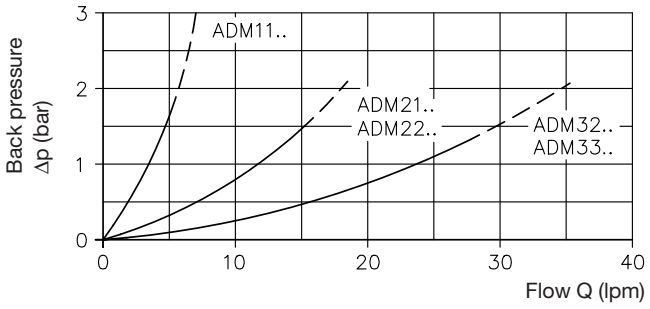
Example type ADM 22 C



The figures for the outlet pressure at A listed in table 2, sect. 2 apply to $Q_{P\rightarrow A}$ = 0 lpm, i.e. the consumer has achieved its end position and doesn't move anymore (static pressure). The pressure p_A will drop slightly for Q≠0, i.e. the consumer hasn't achieved its end position and is still moving. This operation sequence of the valve is usually of no concern during the use of the valve.

An overdrive will occur, when an external force acts on the consumer, resulting in a pressure rise which exceeds the current pressure setting for p_A and leads to a reversed flow A→L . The pressure apparent at A will rise slightly above the set pressure under such conditions.
Note:
Any pressure setting or variation should be monitored by a pressure gauge always!

Δp-Q curves for return flow A→P (see also "Flow direction")



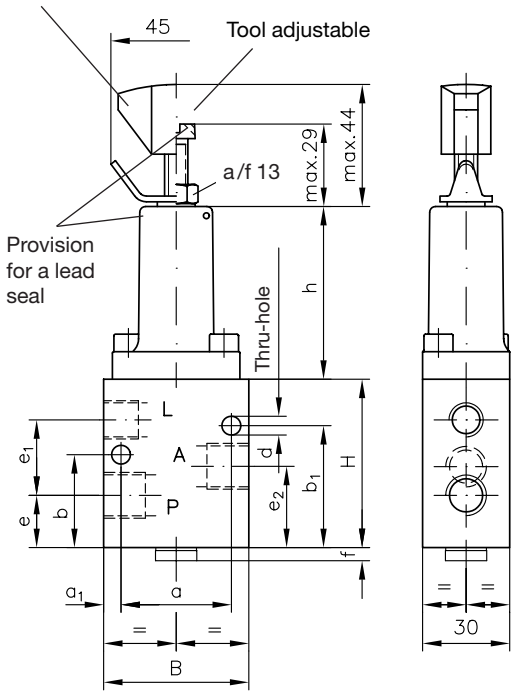
Oil viscosity during the tests 50 mm²/s

4. Unit dimensions

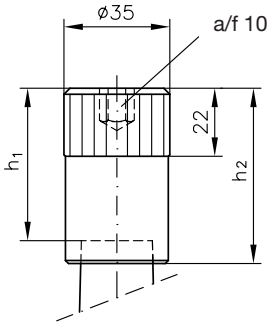
All dimensions in mm, subject to change without notice !

4.1 Valve for pipe connection

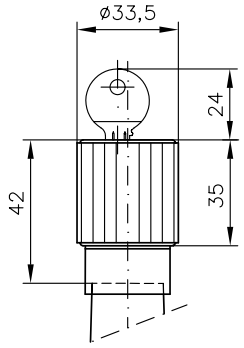
Means of adjustment coding **R**



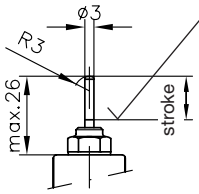
Means of adjustment coding **V**



Means of adjustment coding **H**



Means of adjustment coding **T (TS)**



The actuation is designed for axial direction loads only, any side loads are not permissible !

Attention:
Do not exceed the end position for the adjustment device!
The actuator (cam) should be designed in such a way that either a mechanical stop is provided or the permissible can not be exceeded.

Pressure range (coding)	Actuation Stroke (mm)	Force (N)
A	7.5	570
C	12.5	385
D	13	260
F	16.5	67

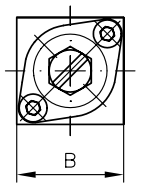
Type	B	H	a	a1	b	b1	d	e	e1	e2	f	h	h1	h2
ADM 11	45	50	33	6	26.5	36.5	6.5	15	23	25	3.5	49.5	41	58
ADM 21(22)	50	58	38	6	32	42	6.5	18	26	28	3.5	49.5	41	58
ADM 32(33)	60	70	40	10	10	58	9	28	28	40	8	59.5	56	64

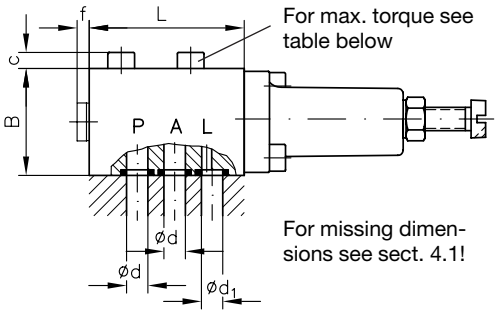
Ports ISO 228/1 (BSPP):

Type	P and A	L
ADM 11(21)	G 1/4	G 1/4
ADM 22(32)	G 3/8	G 1/4
ADM 33	G 1/2	G 1/4

4.2. Valve for manifold mounting

Only the tool adjustable version is illustrated here. For other actuations coding R, V, H, and T(TS), see sect. 4.1!





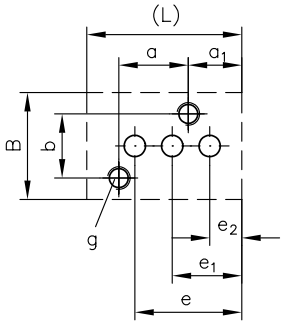
For max. torque see table below

For missing dimensions see sect. 4.1!

Adjustment of the pressure reducing valve (rough guideline)

Pressure range Coding	Δp/revolution (bar/rev) ADM 11..	ADM 2.., ADM 3..
A	55	49
C	43	14
D	12	11
F	4	2

Hole pattern of the manifold (top view)



Type	B	L	a	a1	b	c	d	d1	e	e1	e2
ADM 11 P	35	50	24	17	24	6	6	6	35	22.5	10
ADM 22 P	40	58	26	20	24	6	8	8	40	26	12
ADM 33 P	40	70	40	14	28	8	10	8	42	25	9

Type	f	g	Perm. torque (Nm)	O-rings NBR 90 Sh for ports A and P	L
ADM 11 P	3.5	M6x45	9.5	7.65x1.78	
ADM 22 P	3.5	M6x50	9.5	9.25x1.78	
ADM 33 P	8	M8x50	23	12x2	9.25x1.78