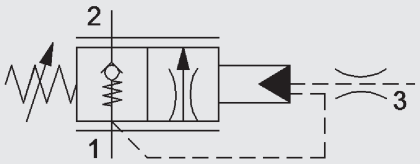
HYDAC INTERNATIONAL

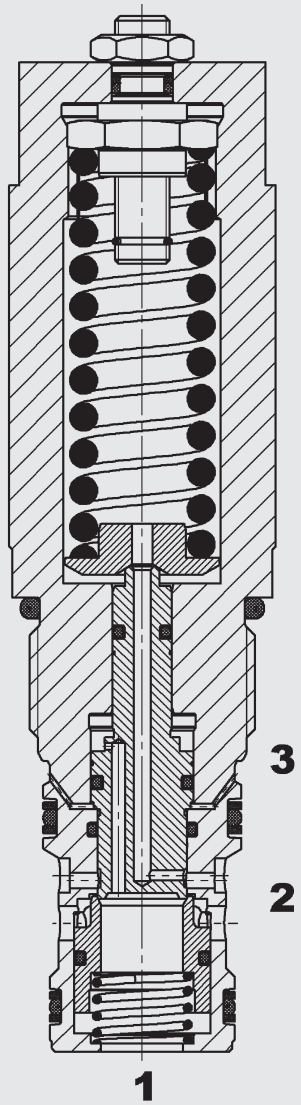
Counter Balance Valve Poppet Type, Direct Acting Metric Cartridge – 350 bar

RSM16121-01



Up to 240 l/min
Up to 350 bar

FUNCTION



The counter balance valve is a direct acting poppet valve. It has to control the lowering speed according to the supply flow rate. It also prevents the consumer from hurrying on ahead when there are pulling loads and allows a jerk-free movement of the same. It also carries out the function of a hose-break valve.
For details about the functionality, see page 3.

FEATURES

- Main application for lift-lowering applications
- Leakage-free holding of the load
- Avoidance of leading pulling loads
- Actuator speed regulation corresponding to the supply flow rate
- Hose break valve for holding the load when the control or meter-in port breaks
- Limiting the load pressure to a set value (overload protection)
- Option: Variant with load-pressure-independent pilot function (version 0)
- Optional: Variant with pilot pressure independent of the tank pressure (Version E can be relieved to the atmosphere or in the special installation space 16122 separately from the tank)
- Optional: Different versions of precision control of the lowering function.
- External surfaces with advanced corrosion protection due to Zn-Ni coating (1,000 h salt spray test)

SPECIFICATIONS

Operating pressure:	max. 350 bar	
Flow rate:	max. 240 l/min	
Cracking pressure of check valve:	2 bar (from port 2 to port 1)	
Pressure setting range:	120 to 240 bar 240 to 420 bar (max. 20 % over the expected max. occurring pressure in the application)	
Operating pressure (at port 1):	p = 0 - 350 bar (max. 80 % of setting pressure)	
Pressure at port 2 (Pump/Tank):	p = 0 - 350bar Notice: Pressures at port 2 increase the pilot and setting pressure. Solution: Vented version (E) of the valve	
Control pressure (port 3):	p = 0 - 350 bar	
Tank pressure (port 4):	p = 0 - 350 bar Notice: This port is only required when the vented version (E) of the valve is used and the trapped oil, which collects in the spring chamber, is to be drained away via a fourth port separate to the tank (cavity 16121)	
Pressure loss from 2 to 1:	approx. 20 bar at 240 l/min (check function)	
Pressure loss from 1 to 2:	Dependent on control sleeve – see performance curves	
Pilot ratio φ:	1:1, 2:1, 3:1, 5:1, 0 (0 = without pressure relief function)	
Leakage:	Leakage-free max. 5 drops/min (0.25 cm³/min) at 350 bar	
Media operating temperature range:	min. -20 °C to max. +100 °C	
Ambient temperature range:	min. -20 °C to max. +100 °C	
Operating fluid:	Hydraulic oil according to DIN 51524 Part 1, 2 and 3	
Viscosity range:	min. 2.8 mm²/s to max. 380 mm²/s	
Filtration:	Permitted operating fluid contamination level according to ISO 4406 Class 18/16/13 or better	
Installation:	No orientation restrictions	
Materials:	Valve body:	Steel
	Piston:	Hardened and ground steel
	Seals:	NBR (standard) FKM (optional, temperature range of operating fluid -20 °C to +120 °C)
	Back-up rings:	PTFE
Cavity:	16121 and 16122	
Weight:	0.9 kg	

* See “Conditions and Instructions for Valves” in brochure 53.000

MODEL CODE

RSM 16121 E - 01 - C - N - 1 - M 240 V 210

Basic model
Counterbalance valve metric

Cavity
16121= 3 Ports
16122= venting to the tank through the 4th port

Additional code
w/o = without venting (standard)
E = Version E - Control pressure independent of tank pressure

Type
01 = standard

Body and ports*
C = Cartridge only
Versions with bodies, see chart

Sealing material
N = NBR (standard)
V = FKM

Pilot ratio ϕ
1 = 1 : 1
2 = 2 : 1
3 = 3 : 1
5 = 5 : 1
0 = Version 0 - see functional principles load pressure-independent control

Resolution (fine control by sleeve)
(Q from 1 to 2 at max. control and Δp = 30 bar)
H = 50 l/min
M = 100 l/min
L = 150 l/min
X = 200 l/min

Pressure range
with pilot ratio φ = 1, 2, 3 and 5
240 = 120 to 240 bar
420 = 240 to 420 bar
with pilot ratio φ = 0
60 = 27 to 60 bar
100 = 60 to 100 bar

Type of adjustment
V = adjustable by tool
F = fixing setting, non-adjustable

Pressure setting
Pressure in bar - Setting on request

STANDARD MODELS

Model code	Part no.
RSM16121-01-C-N-1-M240V	3673605
RSM16121-01-C-N-3-M240V	3526165
RSM16121E-01-C-N-1-M240V	3673607
RSM16121E-01-C-N-3-M240V	3673606

Other versions on request

BODIES

1) In-line bodies*

Code	Part no.	Material	Port	Pressure
R16121-01X-01	3736272	Steel, zinc-plated	G1", G1/4"	350 bar
With venting port:				
R16122-01X-01	3736389	Steel, zinc-plated	G1", G1/4"	350 bar

2) Cross port housing
(2 valves with two-way pilot control)

Code	Part no.	Material	Port	Pressure
H-S16221-SB8	3736200	Steel, zinc-plated	G1"	350 bar

SEAL KITS

Code	Material	Part no.
on request		

CALCULATION OF CONTROL PRESSURE:

standard: $p_{st} = \frac{p_e - p_1}{\varphi} + Kf \times p_2$ **vented:** $p_{st} = \frac{p_e - p_1}{\varphi}$

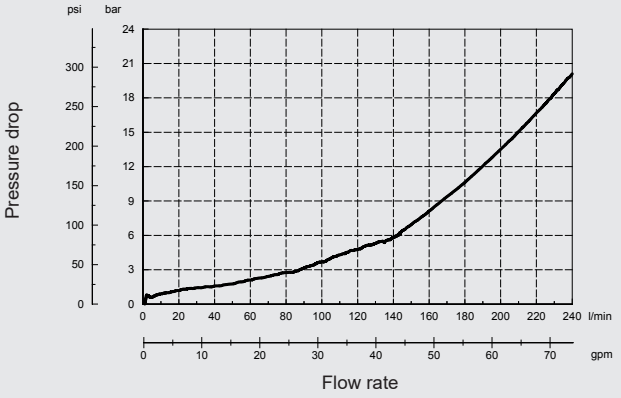
p_e = Setting pressure
p_{st} = Control pressure
p_1 = Load pressure
p_2 = Tank pressure
φ = Pilot ratio

Kf (φ = 1) = 2
Kf (φ = 2) = 1.5
Kf (φ = 3) = 1.3
Kf (φ = 5) = 1.2
$p_e \geq 1.2 \times p_1$

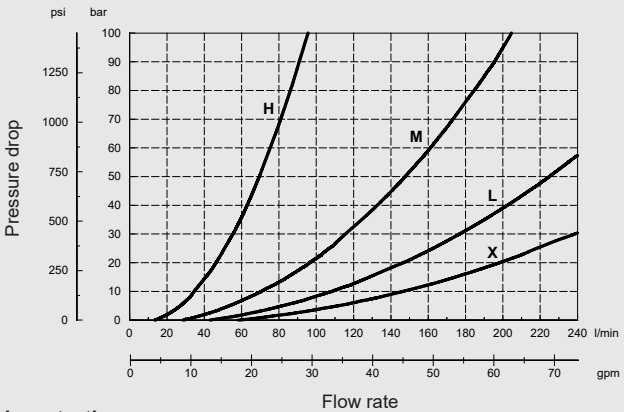
TYPICAL PERFORMACE

Measured at ν = 33 mm²/s, T_{oil} = 46 °C, φ = 3:1

Throttle curve: Δp-Q from 2→1
The throttle curve shows the back pressure on the flow rate from port 2→1.



Throttle curve: Δp-Q from port 1→2 maximum pilot control
The throttle curve shows the back pressure on the flow rate from port 1→2.
(for different fine control sleeves)

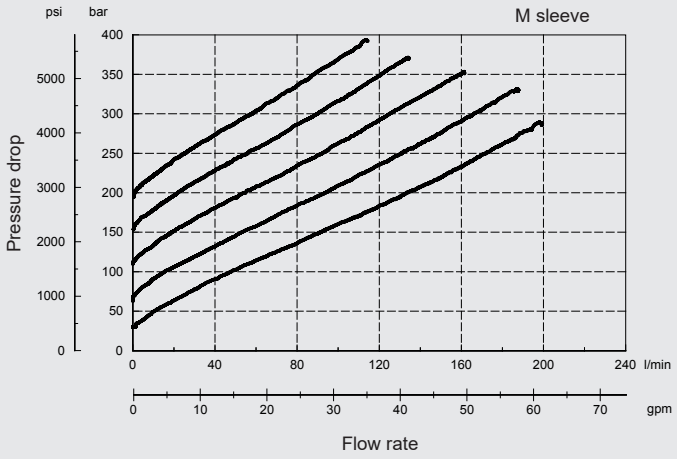


Important!
The differential pressure from port 1 to 2 on a fully controlled valve is dependent on the resolution of the fine control sleeve.
When the resolution of the pilot function is higher, the back pressure increases.

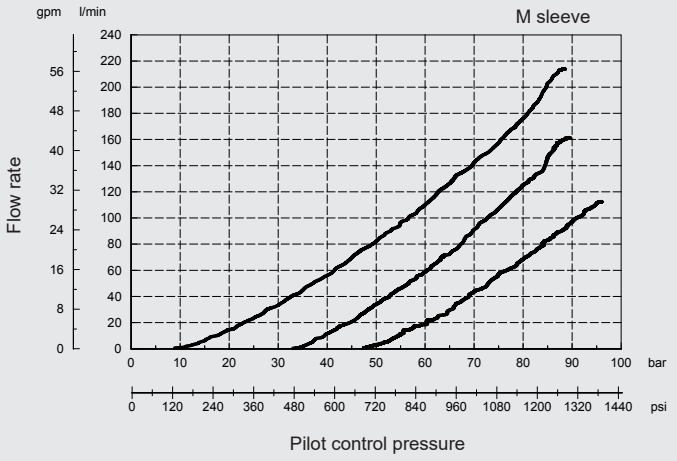
TYPICAL PERFORMACE

Measured at ν = 33 mm²/s, T_{oil} = 46 °C, φ = 3:1

Overload curve:
Pressure at 1 via volume flow from 1 to 2, p_{st} = 0 bar
Overload protection of the system through volume flow-dependent pressure limitation at port 1.

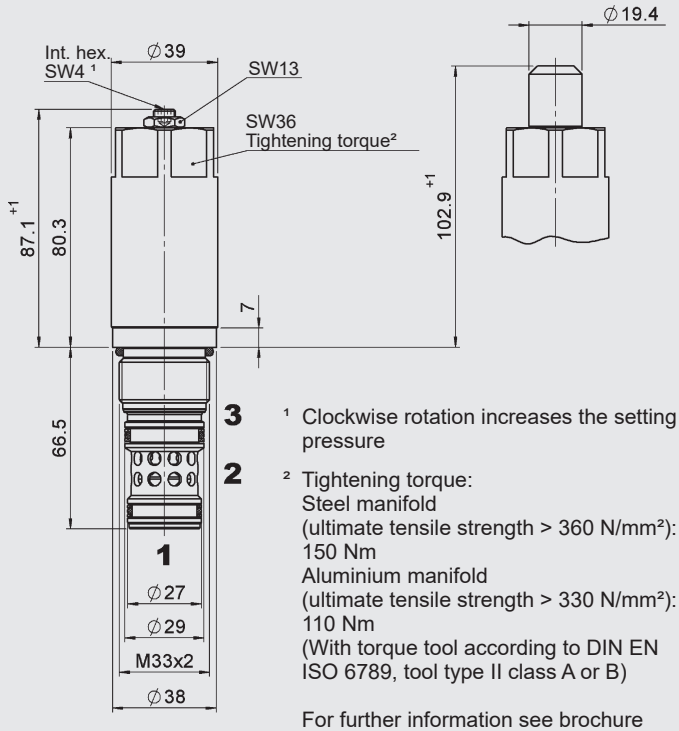


Pilot curve: (flow from 1 to 2 via pilot pressure to 3)
The pilot function shows the lowering speed on the pilot control pressure. Setting pressure: 200 bar; Load pressure: 25, 50, 85% of set pressure



DIMENSIONS

RSM16121-01-V **RSM16121-01-F**



¹ Clockwise rotation increases the setting pressure

² Tightening torque:
Steel manifold
(ultimate tensile strength > 360 N/mm²):
150 Nm
Aluminium manifold
(ultimate tensile strength > 330 N/mm²):
110 Nm
(With torque tool according to DIN EN ISO 6789, tool type II class A or B)

For further information see brochure No. 53.000 "Conditions and instructions for valves"

Millimetre
Subject to technical modifications

CONTINUATION OF FUNCTION PRINCIPLE

With the counterbalance valve, to raise a load, flow is permitted from pump connection 2 to consumer port 1 via the built-in check valve.

To hold the load, the check valve is pressed against its seat by the load pressure at port 1 and seals leakage-free (pilot port 3 must be released of pressure).

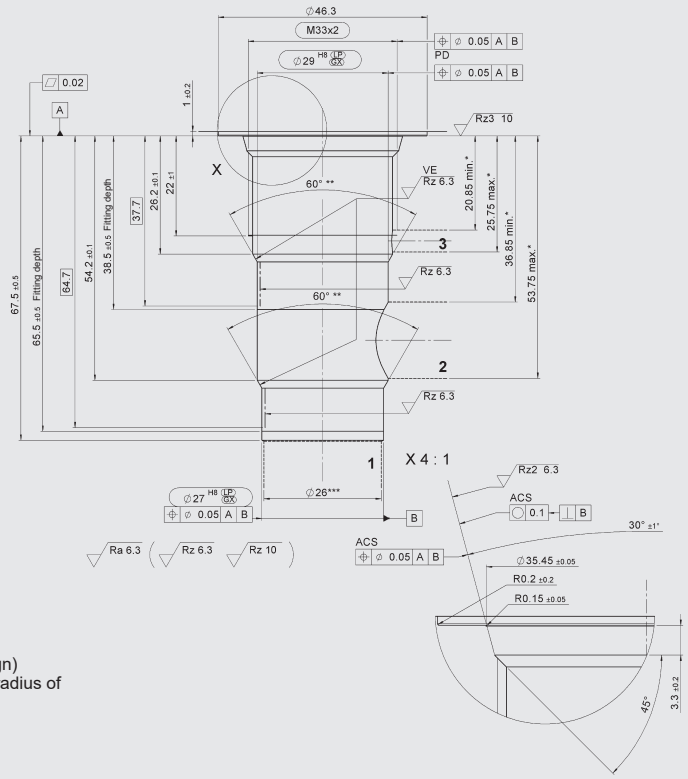
To lower the load, pressure is applied to pilot port 3 which controls the valve. Flow is now permitted from consumer port 1 to port 2. A speedingahead of the load is prevented because the flow rate is controlled at the metering edge of the control piston according to the inlet pressure of the load.

An additional relief function of the load pressure is provided in that the actuator pressure (load pressure) at port 1 acts on a control piston within the valve and therefore against the force of the adjustment spring. When the spring tension is exceeded in case of overload, the control piston moves away from the check valve piston, and this opens the flow path from port 1 to 2 – the resulting flow limits the load pressure to the pre-set value. For the version without venting, a pressure at port 2 is added to the set value.

Version 0 with load pressure-independent pilot control:
Only the amount of pilot pressure at port 3 determines the opening area of port 1 to port 2. Here the valve opens as soon as the pilot control pressure exceeds the set pressure. The valve does not have a pressure relief function for the consumer-side pressure protection at port 1. There is free flow through the valve via the check function from port 2 to port 1.

CAVITY

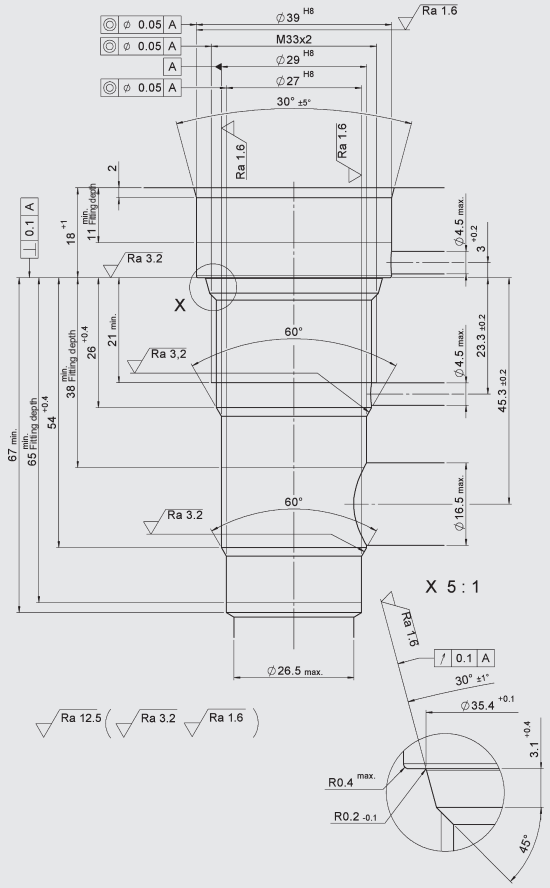
16121



VE = visual examination
* Permitted boring zone (for manifold design)
** Sharp edges should be avoided using a radius of 0.1 mm to 0.2 mm
*** Largest pre-drilling diameter (nominal tool diameter)

Version E

16122



Form tools

Tool	Part no.
on request	

Millimetre
Subject to technical modifications

Note

The information in this brochure relates to the operating conditions and applications described. For applications not described, please contact the relevant technical department.
Subject to technical modifications.

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