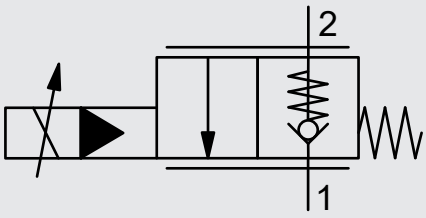
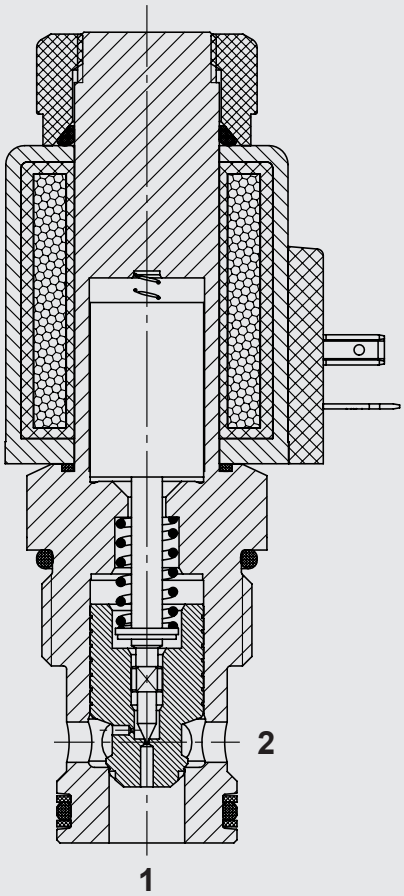



up to 200 l/min
up to 350 bar

# Proportional flow throttle valve
# PWS16Z-01/-03

## Poppet type, pilot-operated, normally closed
## Screw-in cartridge valve UNF – 350 bar

## FUNCTION




## PRODUCT ADVANTAGES

- Continuous adjustment of the flow rate, depending on the coil current
- Excellent stability over the entire flow range
- Very good dynamic performance
- Optional: mechanical adjustment of a point on the performance curve (cannot be combined with emergency manual function)
- Optional: Softshift function with longer switching times possible
- External surfaces with advanced corrosion protection thanks to ZnNi coating (1,000 h salt spray test)

## DESCRIPTION OF FUNCTION

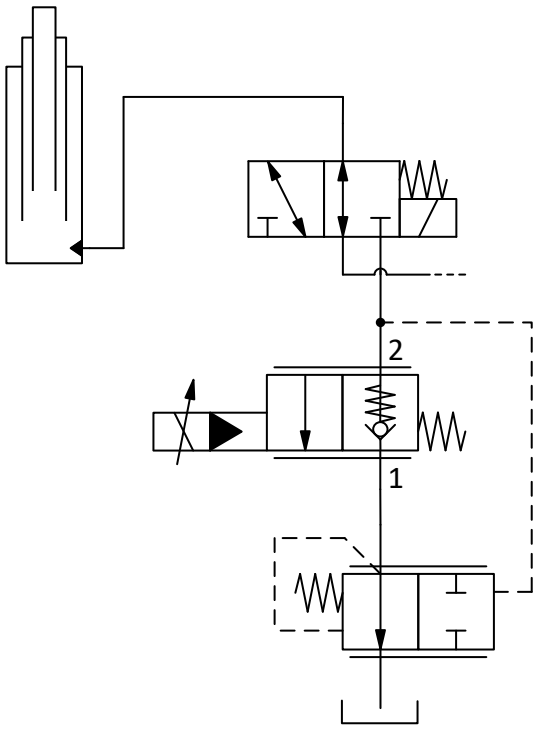
The proportional flow throttle valve is a pilot-operated, spring-loaded throttle valve in poppet design – normally closed position.

It provides smooth and pressure-dependent throttling of flow from port 2 to port 1. The pilot stage opens depending on the current fed through the coil and oil flows to the rear side of the main spool through a combination of orifices.

This creates a pressure difference and the main piston follows the pilot stage. The valve acts as a check valve when de-energised. Once a spring preload has been overcome, flow can pass freely through the valve from 1 to 2 and the valve closes leaktight in the opposite direction from 2 to 1.

Together with a pressure compensator the proportional flow throttle valve can be used as a proportional flow regulator – for example when required to lift/lower variable loads at the same velocity.

See example of application.




Example of lifting-lowering application

## TECHNICAL CHARACTERISTICS[1)]

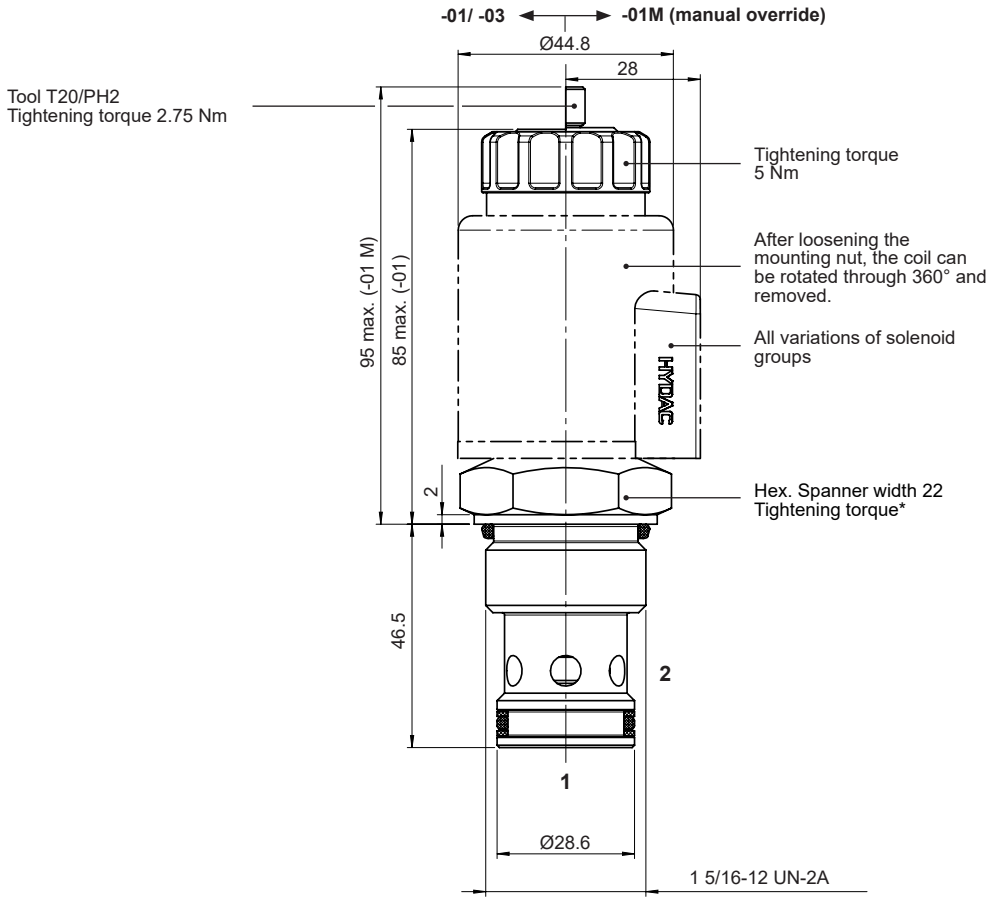
| | | |
|---|---|---|
| Operating pressure | max. 350 bar | |
| Flow rate | max. 200 l/min | |
| Internal leakage | max. 10 drops/min (0.5 $cm^3$/min) at nominal pressure, $\nu$ = 34 $mm^2/s$ | |
| Pressure fluid | Hydraulic oil to DIN 51524 Part 1, 2 and 3 | |
| Ambient temperature range | min. -20 °C to max. +60 °C | |
| Temperature range of operating fluid | NBR: min. -30 °C to max. +100 °C<br>FKM: min. -20 °C to max. +120 °C | |
| Viscosity range | Min. 10 $mm^2/s$ to max. 420 $mm^2/s$ | |
| Filtration | Permitted contamination level of the pressure fluid in acc. with ISO 4406 Class 19/17/14 or better | |
| $MTTF_D$ | 150 - 1200 years, assessment according to DIN EN ISO 13849-1:2016, Table C.1, Confirmation of ISO 13849-2:2013; Tables C.1 and C.2 | |
| Installation position | User-definable | |
| Material | Valve body: | Steel |
| | Spools: | Steel, hardened and ground |
| | Seals: | NBR (standard) |
| | | FKM (optional) |
| | Support rings: | PTFE |
| | Coil: | Steel / polyamide |
| Cavity | FC16-2 | |
| Weight | 0.9 kg (with coil) | |
| **Electric system** | | |
| Control current range | 1600 mA, 5.0 Ω (12 V)<br>820 mA, 18.0 Ω (24 V) | |
| Dither frequency | 120 Hz - 250 Hz (120 Hz recommended) | |
| Hysteresis with dither | 4 - 6 % of $I_{nom}$ | |
| Repeatability | ≤ 1.5 % of $I_{nom}$ | |
| Reversal error | ≤ 2 % of $I_{nom}$ | |
| Sensitivity of response | ≤ 1 % of $I_{nom}$ | |
| Coil design | 50-2345 | |

Note:
For optimum efficiency, any trapped air should be vented using the bleed screw on the pole tube.

[1)] See “Conditions and Instructions for Valves” in brochure 53.000

## DIMENSIONS

**Versions:**

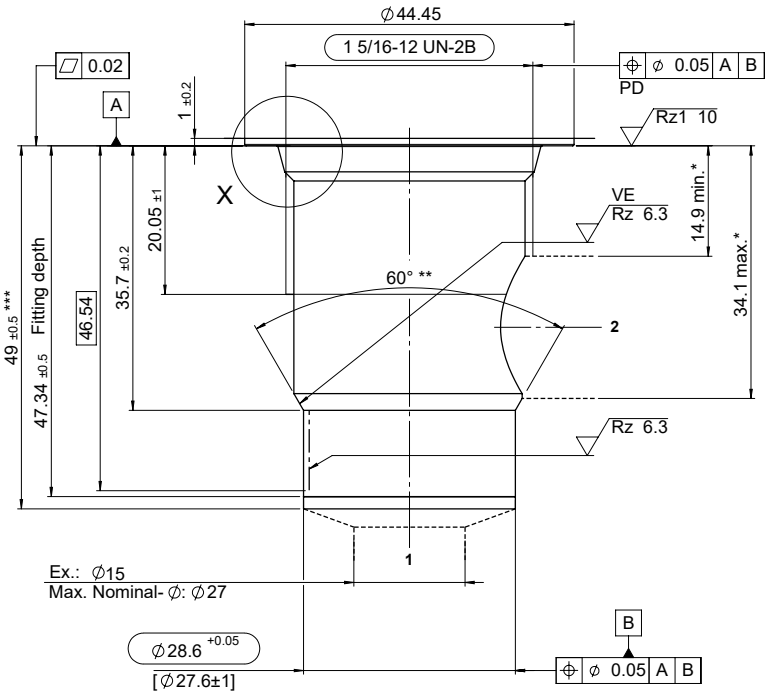



* Tightening torque:
Steel housing (burst strength > 360 N/mm²): 160 Nm
Aluminium housing (burst strength > 330 N/mm²): 120 Nm
(With torque tool according to DIN EN ISO 6789, tool type II class A or B).

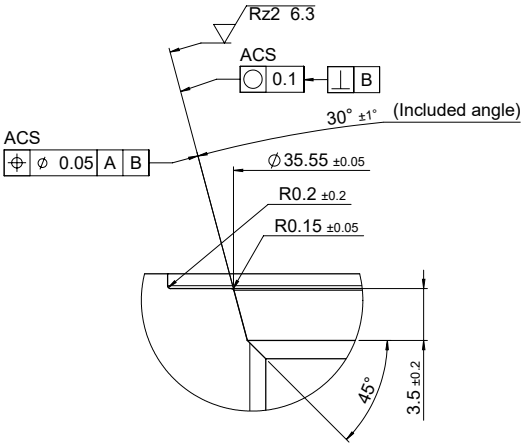
Millimetre
Subject to technical modifications.

## CAVITY

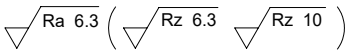
**FC16-2**




X 4 : 1




VE = Visual Examination




* Permitted boring zone (for block design)

** Sharp edges should be avoided by using a radius of 0.1 mm to 0.2 mm

*** Largest pre-drilling diameter (nominal tool diameter)

Millimetre

Subject to technical modifications.

## MODEL CODE

**PWS16Z – 01M – C – N – 80 – 24 PG 18.0**

**Designation**

Proportional flow throttle valve

**Design**

01 = standard

01M = with manual override

03 = damped

**Body and ports**

C = Screw-in cartridge valve

**Sealing material**

N = NBR (standard)

V = FKM

**Flow range at Δp = 5 bar**

80 = 80 l/min (progressive performance curve))

Further versions on request.

**Nominal voltage**

DC voltage:

12 = 12 V DC

24 = 24 V DC

Further versions on request.

**Coil design (50-2345)**

DC:

PG = DIN plug connector to EN175301-803

PT = AMP Junior Timer, 2-pole, radial

PL = two flying leads, 457 mm long, 0.75 mm²

PN = Deutsch plug connector, 2-pole, axial

Further versions on request.

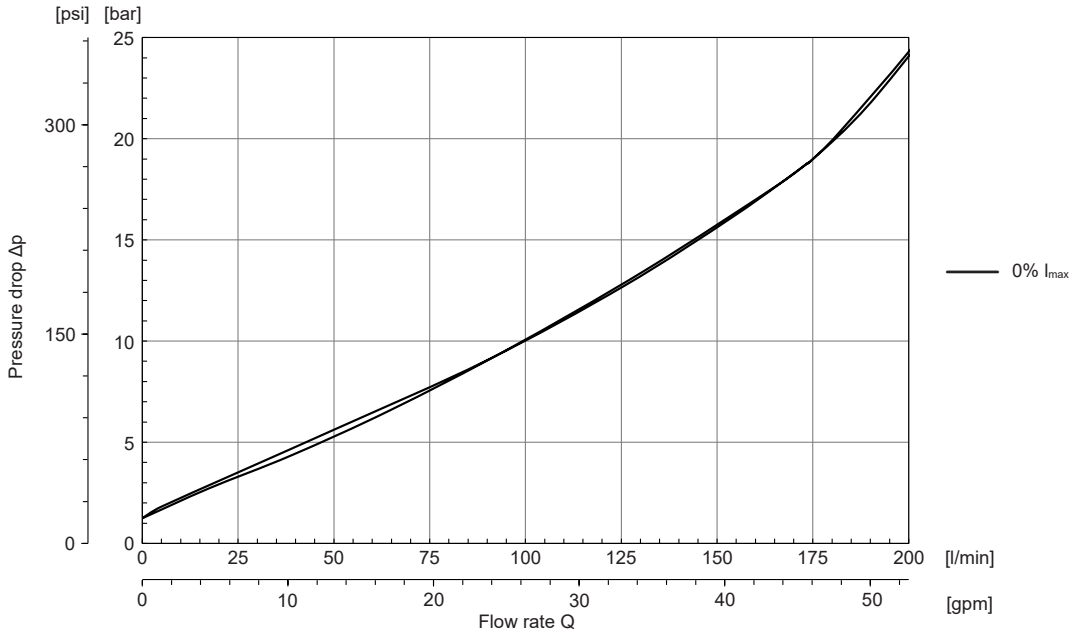
**Coil resistance**

5.0 = 5.0 Ω (12 V)

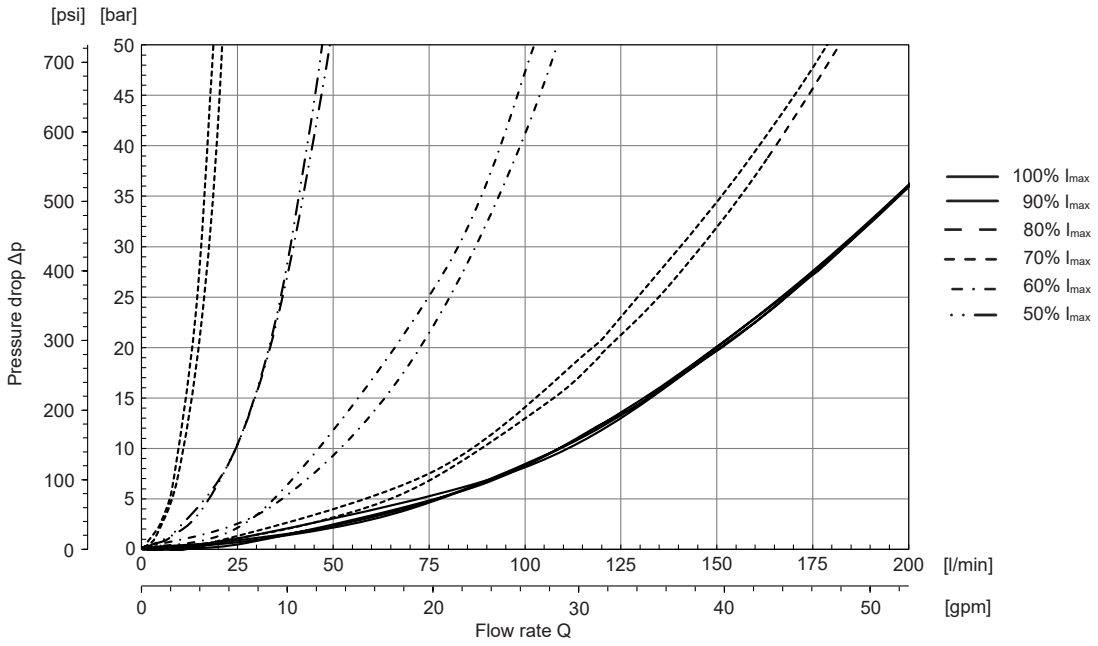
18.0 = 18.0 Ω (24 V)

## TYPICAL PERFORMANCE CURVE

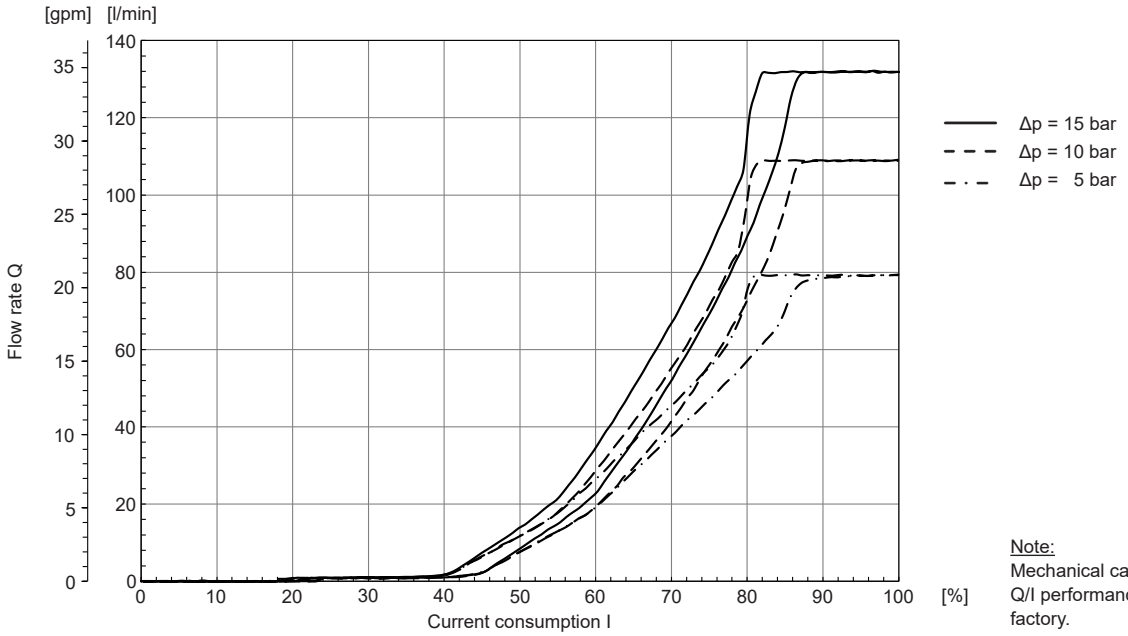
**Δp/Q performance curve 1→2 | progressive (80)** measured at ν = 34 mm²/s, $T_{Oil}$ = 46 °C




**Δp/Q performance curve 2→1 | progressive (80)** measured at ν = 34 mm²/s, $T_{Oil}$ = 46 °C




**Q/I performance curve 2→1 | progressive (80)** measured at ν = 34 mm²/s, $T_{Oil}$ = 46 °C




Note:
Mechanical calibration of a point on the Q/I performance curve is optionally possible at the factory.

# MATERIAL OVERVIEW

## Standard models

| Designation | Part no. |
|---|---|
| PWS16Z-01-C-N-80-0 | 3376799 |
| PWS16Z-01-C-N-80-12PG-5 | 3525225 |
| PWS16Z-01-C-N-80-24PG-18.0 | 3525213 |
| PWS16Z-01-C-N-80-24PN-18.0 | 3888217 |
| PWS16Z-01-C-V-80-0 | 4689995 |
| PWS16Z-01-C-V-80-24PG-18.0 | 4689996 |
| PWS16Z-01M-C-N-80-0 | 3817425 |
| PWS16Z-01M-C-V-80-0 | 4553724 |
| PWS16Z-01M-C-V-80-24PG-18.0 | 4553925 |
| PWS16Z-03-C-N-80-0 | 4132585 |

Further versions on request.

## Spare parts, seal kits

| Designation | Material | Code | Part no. |
|---|---|---|---|
| Seal kit | NBR | FS UNF16/N | 3651395 |
| Seal kit | FKM | FS UNF16/V | 3651396 |

## Housing

| Designation | Material | Code | Pressure | Connections | Weight | Part no. |
|---|---|---|---|---|---|---|
| Inline connection housing | Steel, zinc-plated | FH162-SB8 | 350 bar | G1" | 1.6 kg | 3032496 |
| Inline connection housing | Aluminium, anodised | FH162-AB8 | 210 bar | G1" | 0.61 kg | 3037193 |

## Cavity tools

| Designation | Part no. |
|---|---|
| Countersink | 176218 |
| Reamer | 176219 |

# NOTE

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

Subject to technical modifications.

Documents are only valid if they have been obtained via the website and are up-to-date.

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