Valve specification made simple

Danfoss offers a number of proportional valves with a variety of features, flow rates and performance levels. This guide is designed to simplify the specification of our proportional valve product range. On the back side of this sheet is a chart detailing valve capabilities, arranged in a decision tree format. Start in the top left, and follow these steps to select the appropriate valve:

Step 1: Determine whether the application requires a valve with or without onboard electronics (OBE). Valves with OBE do not require an external controller (PAM card). The controller is built into the valve.

Step 2: Determine whether the application requires a single-stage or dual-stage valve. This decision is made primarily because of flow. For size 5 only, occasionally the lower pressure rating of a spool in body is needed.

Step 3: Determine which valve type is suitable for the application. The valve types listed within the chart include the options detailed to the right.

Step 4: Select the appropriate size.

Step 5: Refer to the specific product catalog for additional details such as pressure ratings, available spool types, power capacity curves, etc., to finalize selection.

Danfoss proportional valve types

Single stage

AxisPro: Single solenoid digital valve. Spool goes to 4th position when power is removed. Amplifier has spool position feedback.

- Level 1: Digital version of the KBS valve
- Level 2: Has external sensor inputs, which allow closing higher level control loops on the valve, e.g. cylinder position/speed, force
- Level 3: Level 2 plus built-in pressure sensors

KBS: Single solenoid analog valve. Spool goes to 4th position when power is removed. Amplifier has spool position feedback.

KBF: Dual solenoid analog valve. Spool stays in center position when power is removed. Amplifier has spool position feedback.

KBD: Dual solenoid digital valve. Spool stays in center position when power is removed. Amplifier does not have spool position feedback.

Dual stage

AxisPro: Pilot spool goes to 4th position when power is removed. Amplifier has pilot and main-stage spool position feedback.

- Level 1: Digital version of the KBH valve
- Level 2: Has external sensor inputs, which allow closing higher level control loops on the valve, e.g. cylinder position/speed, force
- Level 3: Not available

KBH: Pilot spool goes to 4th position when power is removed. Amplifier has pilot and main-stage spool position feedback.

KBF: Pilot spool stays in center position when power is removed. Amplifier has only main-stage spool position feedback.

KBD: Pilot spool stays in center position when power is removed. Amplifier has no spool position feedback.

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Danfoss proportional valve product guide

Decision 1: Onboard electronics (OBE) or non-OBE	Decision 2: Single stage or dual stage	Decision 3: Valve type	Size	Technology	Max rated flow	Maximum pressure P, A & B ports	Speed	Flow accuracy	Response time 0%-100%	Hysteresis	Valve closes external loops
OBE	Single stage (up to 100 L/min)	AxisPro	Size 3	Spool/sleeve (rated @ 70 bar)	40 L/min @ 70 bar	350 bar	+++	+++	8 ms	<0.1%	yes
			Size 5	Spool/sleeve (rated @ 70 bar)	100 L/min @ 70 bar	350 bar	+++	+++	16-22 ms	<0.1%	yes
		KBS	Size 3	Spool/sleeve (rated @ 70 bar)	40 L/min @ 70 bar	350 bar	+++	+++	10 ms	<0.5%	no
		KBF	Size 3	Spool in body (rated @10 bar)	30 L/min @ 10 bar	350 bar	++	++	17 ms	<1%	no
			Size 5	Spool in body (rated @10 bar)	75 L/min @ 10 bar	315 bar	++	++	30 ms	<1%	no
		KBD	Size 3	Spool in body (rated @10 bar)	28 L/min @ 10 bar	350 bar	+	+	26 ms	<8%	no
			Size 5	Spool in body (rated @10 bar)	70 L/min @ 10 bar	315 bar	+	+	115 ms	<8%	no
	Dual stage	AxisPro	Size 5	Spool in body (rated @10 bar)	95 L/min @ 10 bar	315 bar	+++	+++	24 ms	<0.4%	yes
			Size 7	Spool in body (rated @10 bar)	230 L/min @ 10 bar	350 bar	+++	+++	38 ms	<0.4%	yes
			Size 8	Spool in body (rated @10 bar)	375 L/min @ 10 bar	350 bar	+++	+++	33 ms	<0.4%	yes
		KBH	Size 5	Spool in body (rated @10 bar)	95 L/min @ 10 bar	310 bar	+++	+++	24 ms	<0.5%	no
			Size 7	Spool in body (rated @10 bar)	180 L/min @ 10 bar	350 bar	+++	+++	24 ms	<0.5%	no
			Size 8	Spool in body (rated @10 bar)	375 L/min @ 10 bar	350 bar	+++	+++	33 ms	<0.5%	no
			Size 10	Spool in body (rated @10 bar)	700 L/min @ 10 bar	350 bar	+++	+++	64 ms	<0.5%	no
		KBF	Size 5	Spool in body (rated @10 bar)	95 L/min @ 10 bar	310 bar	++	++	47 ms	<1%	no
			Size 7	Spool in body (rated @10 bar)	200 L/min @ 10 bar	350 bar	++	++	52 ms	<1%	no
			Size 8	Spool in body (rated @10 bar)	375 L/min @ 10 bar	350 bar	++	++	84 ms	<1%	no
			Size 10	Spool in body (rated @10 bar)	700 L/min @ 10 bar	350 bar	++	++	130 ms	<1%	no
		KBD	Size 5	Spool in body (rated @10 bar)	90 L/min @ 10 bar	315 bar	+	+	42 ms	<8%	no
			Size 7	Spool in body (rated @10 bar)	180 L/min @ 10 bar	350 bar	+	+	45 ms	<8%	no
			Size 8	Spool in body (rated @10 bar)	330 L/min @ 10 bar	350 bar	+	+	85 ms	<8%	no
			Size 10	Spool in body (rated @10 bar)	550 L/min @ 10 bar	350 bar	+	+	110 ms	<8%	no
Non-OBE	Single stage (up to 70 L/min)	KSD	Size 3	Spool/sleeve (rated @ 70 bar)	40 L/min @ 70 bar	350 bar	+++	+++	10 ms	<0.5%	no
		KFD	Size 3	Spool in body (rated @10 bar)	28 L/min @ 10 bar	350 bar	++	++	18 ms	<1%[2]	no
			Size 5	Spool in body (rated @10 bar)	70 L/min @ 10 bar	315 bar	++	++	31 ms	<1%[2]	no
		KDG	Size 3	Spool in body (rated @10 bar)	30 L/min @ 20 bar	350 bar	+	+	100 ms	<8%[2]	no
			Size 5	Spool in body (rated @10 bar)	70 L/min @ 10 bar	See note 3	+	+	See note 3	<8%[2]	no
	Dual stage	KHD	Size 5	Spool in body (rated @10 bar)	100 L/min @ 10 bar	350 bar [1]	+++	+++	24 ms	<1%	no
			Size 7	Spool in body (rated @10 bar)	200 L/min @ 10 bar	350 bar [1]	+++	+++	24 ms	<1%	no
			Size 8	Spool in body (rated @10 bar)	300 L/min @ 10 bar	350 bar [1]	+++	+++	37 ms	<1%	no
			Size 10	Spool in body (rated @10 bar)	700 L/min @ 10 bar	350 bar [1]	+++	+++	See note 3	<1%	no
		KDG	Size 5	Spool in body (rated @10 bar)	90 L/min @ 10 bar	350 bar	+	+	48 ms	<4%	no
			Size 7	Spool in body (rated @10 bar)	180 L/min @ 10 bar	350 bar	+	+	61 ms	<4%	no
			Size 8	Spool in body (rated @10 bar)	330 L/min @ 10 bar	350 bar	+	+	80 ms	<4%	no
			Size 10	Spool in body (rated @10 bar)	550 L/min @ 10 bar	350 bar	+	+	208 ms	<6%	no

[1] 350 bar max pressure if valve purchased with pressure reducer. Otherwise max pressure is 210 bar.

[2] Hysteresis value if valve is utilized with a matching Danfoss PAM card.

[3] Refer to catalog for exact value.

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