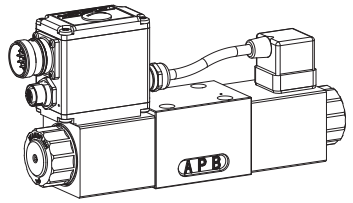
Proportional directional control valve

- **Integrated amplifier or controller electronics**
- **Direct operated, not pressure compensated**
- **Q_{max} = 40 l/min**
- **Q_N = 32 l/min**
- **p_{max} = 350 bar**

NG6
ISO 4401-03

DSV DIGITAL SMART VALVE



DESCRIPTION

Direct operated proportional spool valve with integrated electronics in flange design NG6 acc. to ISO 4401-03 / 7790 with 4 ports. These plug & play valves are factory set and adjusted. High valve-to-valve reproducibility. Housing for electronics with protection class IP67 for harsh environment. The spool valve is designed acc. to the 5 chamber principle. The volume flow is adjusted by a Wandfluh proportional solenoid (VDE standard 0580). Low pressure drop due to the body design and spool profiling. The spool is made of hardend steel. The body made of high grade hydraulic casting is painted. The armature tube, the solenoid coil and the plug crew are zinc coated.The housing for the electronics is made of aluminium.

FUNCTION

Proportionally to the command signal applied to the electronics spool stroke, metering opening and volume flow increase. The control connection is provided by an analog interface or a fieldbus interface (CANopen, J1939 or Profibus DP). Parameter setting and diagnosis with the free-of-charge software «PASO» or via fieldbus interface. The USB parameterisation interface is accessible through a cover flap.. “PASO” is a Windows program in the flow diagram style, which enables the intuitive setting and storing of all variable parameters. The data remain saved in case of a power failure and can also be reproduced and transferred to other DSVs. The available controller structure has been optimised for applications with hydraulic actuators.

APPLICATION

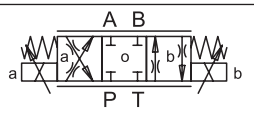
Proportional directional spool valves with integrated electronics are well suited for demanding applications where high resolution, high volume flow and low hysteresis are requested. They are implemented in systems calling for good valve-to-valve reproducibility, easy installation, comfortable operation and high precision in industrial hydraulics as well as in mobile hydraulics for the smooth control of actuators. The integrated controller reliefs the machine control system and operates the axis (position, angle, pressure, etc.) in a closed control loop. Application examples: pitch control of wind generators, forest and earth moving machines, machine tools and paper production machines with simple position controls, robotics and fan control.

TYPE CODE

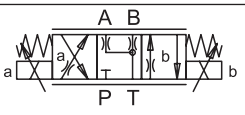
W D P F A06 - [ ] - [ ] - [ ] - [ ] / M E [ ] [ ] - [ ] [ ] # [ ]

Spool valve		
Direct operated		
Proportional		
Flange construction		
International standard interface ISO, NG6		
Description of symbols acc. to table		
Nominal volume flow Q_N	5 l/min	5
	10 l/min	10
	16 l/min	16
	32 l/min	32
Nominal voltage U_N	12 VDC	G12
	24 VDC	G24
Slip-on coil	Metal housing, square	
Electric connection	Integrated electronics	
Hardware configuration		
With analog signal (-10…+10 V factory set)		A2
With CANopen acc. to DSP-408		C1
With Profibus DP in accordance Fluid Power Technology		P1
With CAN J1939 (on request)		J1
Function		
Amplifier	no remark	
Controller with current feedback signal (0...20 mA / 4...20 mA)		R1
Controller with voltage feedback signal (0...10 V)		R2
Sealing material	NBR	
	FKM (Viton)	D1
Manual override	Integrated	
	Push-button	HF1
	Spindle	HS1
Design-Index (Subject to change)		

TYPE CHARTS / DESIGNATIONS OF SYMBOLS



ACB - S
S = Symmetrical control mode



ADB - V
V = Meter-in control mode

GENERAL SPECIFICATIONS

Nominal size	NG6-Mini acc. to ISO 4401-03 / 7790
Designation	4/3-way proportional valve with integrated electronics
Construction	Direct operated spool valve
Operations	Proportional solenoid
Mounting	Flange, 4 fixing holes for socket head cap screws M5x50
Connections	Multi-station flange subplate Longitudinal stacking system
Ambient temperature	-20…+65 °C (typical) (The upper temperature limit is a guideline value for typical applications, in individual cases it may also be higher or lower. The electronics of the valve limit the power in case of a too high electronics temperature. More detailed information can be obtained from the operating instructions «DSV».)
Mounting position	any, preferably horizontal
Fastening torque	M_D = 5,5 Nm (Qualität 8.8) for fixing screws M_D = 5 Nm for knurled nut
Weight:	m = 2,8 kg

ELECTRICAL SPECIFICATIONS

Protection class	IP 67 acc. to EN 60 529 with suitable connector and closed electronics housing
Supply voltage	12 VDC or 24 VDC
Ramps	adjustable
Parameterisation	via Fieldbus or USB
Interface	USB (Mini B) for parameterisation with «PASO» (under the closing screw of the housing cover, Preset ex-works
Analog interface:	
Device receptacle (male)	M23, 12-poles
Mating connector	Plug (female), M23, 12-poles (not incl. in delivery)
Preset value signal	Input voltage / current as well as signal range can be set by software.
Fieldbus interface:	
Device receptacle supply (male)	M12, 4-poles
Mating connector	Plug (female), M12, 4-poles (not incl. in delivery)
Device receptacle CANopen (male)	M12, 5-poles (acc. to DRP 303-1)
Mating connector	Plug (female), M12, 5-poles (not incl. in delivery)
Device receptacle Profibus (female)	M12, 5-poles, B-coded (acc. to IEC 947-5-2)
Mating connector	Plug (male), M12, 5-poles, B-coded (not incl. in delivery)
Preset value signal	Fieldbus
Feedback signal interface (Sensor): (controller only)	
Device receptacle (female)	M12, 5-poles
Mating connector	Plug (male), M12, 5-poles (not incl. in delivery)
Feedback signal::	Voltage / current state when ordering

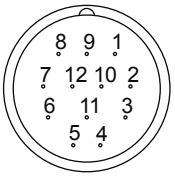
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade β 6…10 ≥ 75) refer to data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Working pressure	p_{max} = 350 bar (connections P, A, B)
Tank pressure	p_{max} = 160 bar (connections T)
Nominal volume flow	Q_N = 5 l/min, 10 l/min, 16 l/min, 32 l/min
Max. volume flow	see characteristic
Leakage volume flow	on request
Hysteresis	≤ 6 %

CONNECTOR WIRING DIAGRAM

Analog interface:

Device receptacle (male) X1



1 = Supply voltage +
2 = Supply voltage 0 VDC
3 = Stabilised output voltage
4 = Preset value voltage +
5 = Preset value voltage -
6 = Preset value current +
7 = Preset value current -
8 = Reserved for extensions
9 = Reserved for extensions
10 = Enable control (Digital input)
11 = Error signal (Digital output)
12 = Chassis

Preset value voltage (PIN 4/5) resp. current (PIN 6/7) are selected with set-up and diagnosis software PASO.
Factory setting: Voltage (-10…+10 V), (PIN 4/5)

CANopen interface:

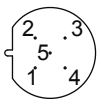
Device receptacle supply (male) X1

MAIN
1 = Supply voltage +
2 = Reserved for extensions
3 = Supply voltage 0 VDC
4 = Chassis

Device receptacle CANopen (male) X3

CAN
1 = not connected
2 = not connected
3 = CAN Gnd
4 = CAN High
5 = CAN Low

Device receptacle Profibus (female) X3

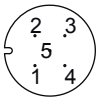


PROFIBUS
1 = VP
2 = RxD / TxD - N
3 = DGND
4 = RxD / TxD - P
5 = Shield

Parameterisation interface (USB, Mini B) X2
Under the closing screw of the housing cover

Feedback signal interface (Sensor)

Device receptacle (female) X4 (only controller)



1 = Supply voltage (output) +
2 = Feedback signal +
3 = Supply voltage 0 VDC
4 = not connected
5 = stab. output voltage

NOTE!
Detailed electrical characteristics and description of «**DSV**» electronics are shown on data sheet **1.13-76**.

START-UP

For DSV amplifiers as a rule no parameter settings by the customer are required. The plugs have to be connected in accordance with the chapter «Pin assignment».

Controllers are supplied configured as amplifiers. The setting of the mode of control and the setting of the controller are done by the customer by software setting (USB interface, Mini B).

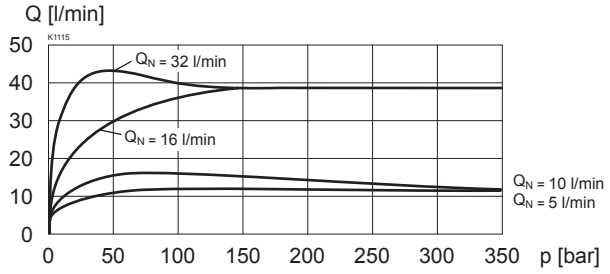
Additional information can be found on our website:
«www.wandfluh.com»

Free-of-charge download of the «PASO»-software and the instruction manual for the «**DSV**» hydraulic valves as well as the operation instruction **CANopen** eg.**Profibus DP** protocol with device profile DSP-408 for «**DSV**».

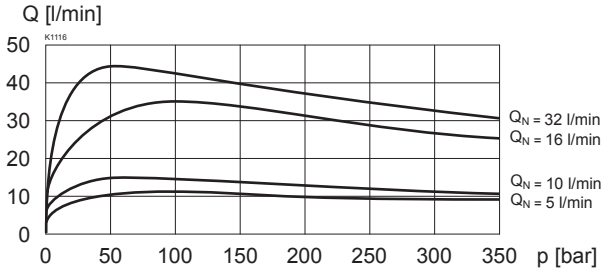
NOTE!
The mating connectors and the cable to adjust are settings is not part of the delivery. Refer to chapter «Accessories».

CHARACTERISTICS oil viscosity ν = 30 mm²/s

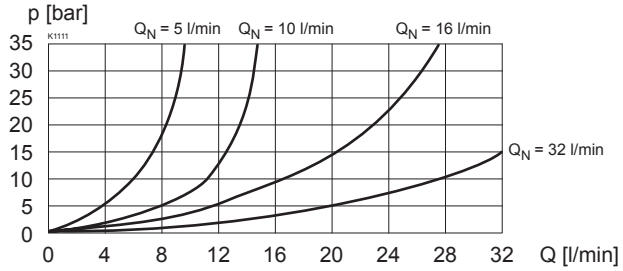
Q = f (p) Volume flow pressure characteristics (s = 100 %)
[Types: ACB-S]



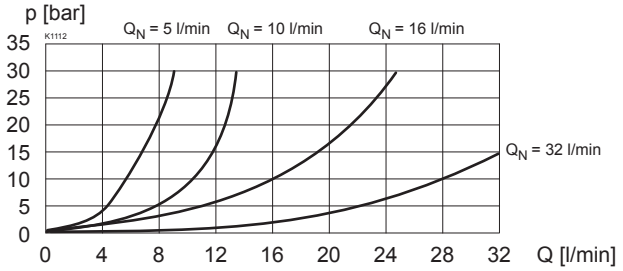
Q = f (p) Volume flow pressure characteristics (s = 100 %)
[Type: ADB-V]



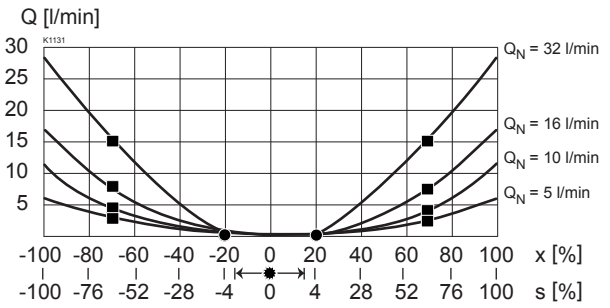
Δp = f (Q) Pressure loss/flow characteristics (s = 100 %)
[Types: ACB-S]



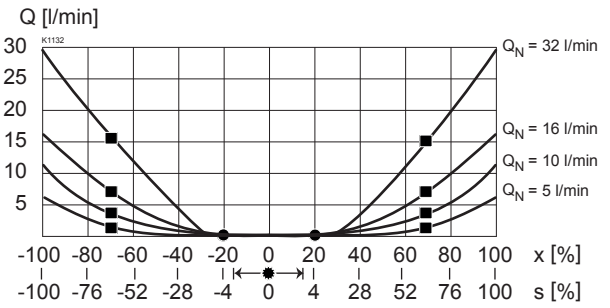
Δp = f (Q) Pressure loss/flow characteristics (s = 100 %)
[Type: ADB-V]



Q = f (s, x) Volume flow adjustment characteristics (Δp = 10 bar)
[Types: ACB-S]
(s corresponds to preset value signal and x corresponds to spool stroke)



Q = f (s, x) Volume flow adjustment characteristics (Δp = 10 bar)
[Type: ADB-V]
(s corresponds to preset value signal and x corresponds to spool stroke)

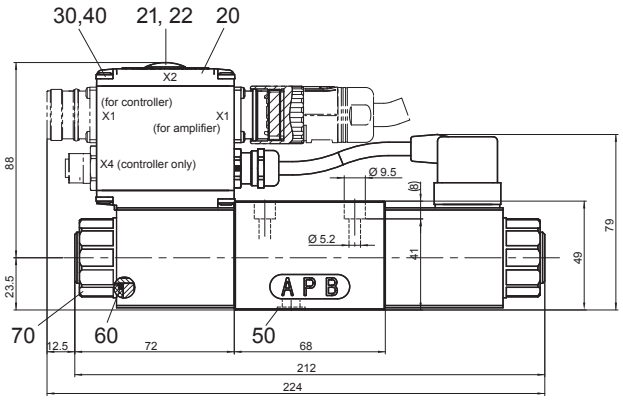


Factory settings:
Dither set for optimal hysteresis
- ✹ = Deadband: Both solenoids switched off with command signal -2 %…+2 %
- ● = Opening point: at command signal ± 4 %
- ■ = Flow at Δp = 10 bar over 2 metering edges at command signal ±70 %

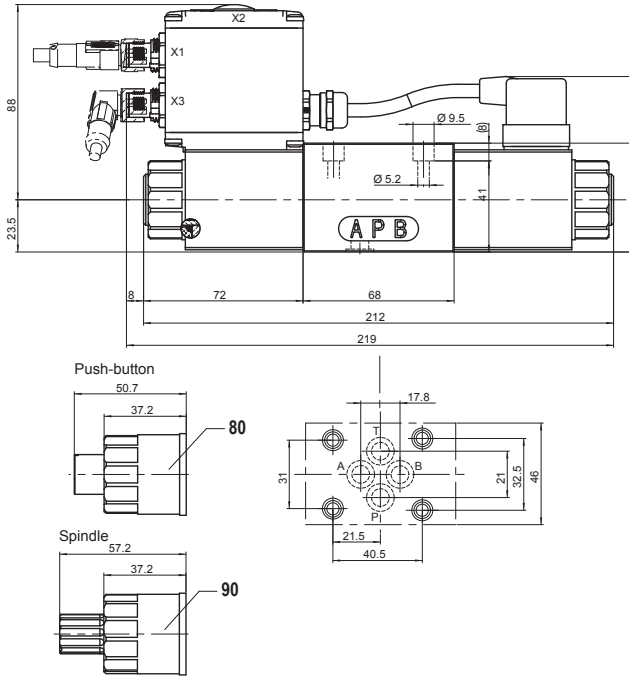
NOTES!
All values measured over 2 metering edges, A and B ports linked.

DIMENSIONS

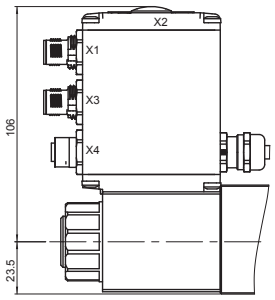
With analog interface
Amplifier and controller



With Fieldbus interface
Amplifier



With Fieldbus interface
Controller



PARTS LIST

Position	Article	Description
20	062.0102	Cover
21	223.1317	Dummy plug M16 x 1,5
22	160.6131	O-ring ID 13,00 x 1,5
30	072.0021	Gasket 33,2 x 59,9 x 2
40	208.0100	Socket head cap screw M4 x 10
50	160.2093 160.6092	O-ring ID 9,25x1,78 (NBR) O-ring ID 9,25x1,78 (FKM)
60	160.2222	O-ring ID 22,22x2,62 (NBR)
70	154.2701	Knurled nut
80	253.7004	Push-button
90	253.7002	Spindle

MANUAL OVERRIDE

- Integrated (–) Actuation pin integrated in the armature tube.

- Push-button (HF1) integrated in the knurled nut.
  Actuation by pressing the pin

- Spindle (HS1) integrated in the knurled nut.
  Actuation by turning the spindle (infi nitely variable valve actuation)

ACCESSOIRES

- Set-up software — see start-up
- Cable to adjust the settings through interface USB
  (from plug type A to Mini B, 3 m) — article no. 219.2896
- Mating connector (plug female) for the analogue interface:
  – straight, soldering contact — article no. 219.2330
  – 90°, soldering contact — article no. 219.2331
  Recommended cable size:
  – Outer diameter 9…10,5 mm
  – Single wire max. 1 mm²
  – Recommended wire size:
  0…25 m = 0,75 mm² (AWG18)
  25…50 m = 1 mm² (AWG17)

Technical explanation see data sheet 1.0-100