

### Proportional spool valves

### **Proportional directional valve**

- pressure compensated
- Q<sub>max</sub> = 8 l/min
- p<sub>max</sub> = 250 bar

### DISCRIPTION

Directly controlled spool valve, actuated by a Wandfluh proportional solenoid (VDE standard 0580), in five chamber design. Wet solenoid in oil. Spools with precision machined oil passages control the oil volume wich is proportional to the solenoid current. Reduced pressure drop achieved by optimised flow channels. Precise spool fit, long life. Spool made of hardened steel, valve body made of high quality cast iron suitable for hydraulic valves. Flange type, threaded connection by means of a connecting plate.

### **FUNCTION**

Spool stroke, aperture and volume flow increase proportionally to the increase in the electric current at the proportional solenoid. This special design senses and compensales load induced flow changes. Flow remains constant with varying pressure. The optimised shape of the spool results in a good resolution of flowimportant for sensitive motion control. To control the valve Wandfluh proportional amplifiers are available (see register 1.13).

NG4-Mini



### APPLICATION

Because of the high resolution and low hysteresis, these valves are particularly suitable for demanding tasks. Applications: handling operations, robots, actuators, radar controlled vehicles, tool making and paper production machines, in other words anywhere where precise control systems are needed.

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TYPE CODE							
		vws -	4	- [	T	F - 🗌	#
Proportional control valve							
Number of control ports							
Symbol type see chart on page	2						
Nominal volume flows: $Q_N = 2 l/min$ $Q_N = 4 l/min$	Q <sub>N</sub> = 6 l/min Q <sub>N</sub> = 8 l/min	[	06 08				
Normally closed							
Standard nominal voltage U <sub>N</sub> :	12 VDC 24 VDC	[	G12 G24				

Design-Index (Subject to change)

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#### **GENERAL SPECIFICATIONS**

Nominal size	NG4-Mini acc. to Wandfluh-standard
Designation	4/2-, 4/3- Proportional control valve
Construction	Direct operated spool valve
Mounting	Flange, 4 holes for socket cap
-	screws M5x40
Fastening torque	$M_{p} = 5,5 \text{ Nm}$ (screw quality 8.8)
Pipe connection	Connection plates, Multi-station flange subplate, Longitudinal stacking system
Mounting position	any
Ambient temperature	-20+50 °C
Weight:	4/2-way m = 1,1 kg
	4/3-way m = 1,4 kg

### **ELECTRICAL SPECIFICATIONS**

Construction	Proportional solenoid, wet pin push type,			
	pressure tight.			
Standard-Nominal voltage	U = 12 VDC	U = 24 VDC		
Limiting current	I <sub>G</sub> = 1250 mA	I <sub>G</sub> = 680 mA		
Relative duty factor 100% DF (see data sheet 1.1-430)				
Protection class	IP 65 to EN 60 529			
Connection / Power supply	supply Over device plug connection			
to ISO 4400/DIN 43650 (2P+E)				
Other electrical specificatio	ns see data sheet 1.1-	115 (PI35V)		

#### HYDRAULIC SPECIFICATIONS Flui

Fluid	Mineral oil, other fluid on request
Contamination	ISO 4406:1999, class 18/16/13
efficiency	(Required filtration grade ß610≥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 <sub>max</sub> = 250 bar (ports P, A, B)
Tank pressure	max tank pressure in T
	p <sub>may</sub> = 160 bar
Nominal volume	$Q_{N} = 2$ l/min $Q_{N} = 6$ l/min
flows	$Q_N^{N} = 4$ l/min $Q_N^{N} = 8$ l/min
Min. volume flow	$Q_{min} = 0,020 \text{ l/min}$
Leakage volume flow	on request
Resolution	1 mA *
Repeatability	≤ 1 % *
Hysteresis	≤ 2 % *
-	* by optimal dithersignal

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### TYPE CHARTS/DESIGNATIONS OF SYMBOLS









### PARTS LIST

Position	Article	Description
10	256.3454 256.3426	Proportional solenoid PI35V-G24 Proportional solenoid PI35V-G12
20	253.8000	Plug with integrated manual override HB4,5
30	219.2001	Plug A (grey)
35	219.2002	Plug B (black)
40	057.4208	Cover
50	246.1161	Socket head cap screw M4x60 DIN 912
60	246.1111	Socket head cap screw M4 x 10 DIN 912
70	160.2052	O-ring ID 5,28x1,78

### ACCESSORIES

Sub-plates Proportional-amplifier

register 2.9 register 1.13

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Technical explanation see data sheet 1.0-100



### **Proportional directional valve**

- pressure compensated
- Q<sub>max</sub> = 20 l/min
- p<sub>max</sub> = 250 bar

### DISCRIPTION

Directly controlled spool valve, actuated by a Wandfluh proportional solenoid (VDE standard 0580), in five chamber design. Wet solenoid in oil. Spools with precision machined oil passages control the oil volume wich is proportional to the solenoid current. Reduced pressure drop achieved by optimised flow channels. Precise spool fit, long life. Spool made of hardened steel, valve body made of high quality cast iron suitable for hydraulic valves. Flange type, threaded connection by means of a connecting plate.

### FUNCTION

Spool stroke, aperture and volume flow increase proportionally to the increase in the electric current at the proportional solenoid. This special design senses and compensales load induced flow changes. Flow remains constant with varying pressure. The optimised shape of the spool results in a good resolution of flowimportant for sensitive motion control. To control the valve Wandfluh proportional amplifiers are available (see register 1.13).

NG6

ISO 4401-03



### APPLICATION

Because of the high resolution and low hysteresis, these valves are particularly suitable for demanding tasks. Applications:

handling operations, robots, actuators, radar controlled vehicles, tool making and paper production machines, in other words anywhere where precise control systems are needed.

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### TYPE CODE



### **GENERAL SPECIFICATIONS**

Nominal size Designation Construction Mounting

Fastening torque Pipe connection

Mounting position Ambient temperature Weight: 4/2-way 4/3-way NG6 acc. to ISO 4401-03 4/2-, 4/3-way proportional control valve Direct operated spool valve Flange, 4 holes for socket cap screws M5 x45  $M_D = 5,5$  Nm (screw quality 8.8) Connection plates, Multi-station flange subplate, Longitudial stacking system any -20...+50 °C m = 1,85 kg m = 2,85 kg

### HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid	on request
Contamination	ISO 4406:1999, class	18/16/13
efficiency	(Required filtration gra	de ß6…10≥75)
	refer to data sheet 1.0	-50/2
Viscosity range	12 mm <sup>2</sup> /s320 mm <sup>2</sup> /s	
Fluid temperature	-20+70 °C	
Working pressure	p <sub>max</sub> = 250 bar (Ports F	P, A, B)
Tank pressure	max tank pressure in 7	Г
	p = 160 bar	
Nominal volume	Q <sub>N</sub> = 2,5 l/min	Q <sub>N</sub> = 10 l/min
flows	$Q_N = 5 l/min$	Q <sub>N</sub> = 15 l/min
	Q <sub>N</sub> = 20 l/min	N.
Min. volume flow	$Q_{min} = 0,02 \text{ l/min}$	
Leakage volume flow	on request	
Resolution	1 mA *	
Repeatability	≤ 1 % *	
Hysteresis	$\leq 2\% *$	
	* by optimal dithersign	al

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#### **ELECTRICAL SPECIFICATIONS**

Construction	Duo no mila no lo no la noid	whether in a set of the second second the last
Construction	Proportional solenoio	wethin hush type hressure tight

Standard-Nominal voltage	U = 12 VDC	U = 24 VDC	
Limiting current: PI35V	I <sub>G</sub> = 1250 mA	I <sub>G</sub> = 680 mA	for VWS4.61 $\rm Q_{_N}$ 2,510 l/min for VWS4.62 $\rm Q_{_N}$ 2,510 l/min
PI45V	l <sub>g</sub> = 1780 mA	I <sub>G</sub> = 810 mA	for VWS4.61 $\rm Q_{_N}$ 1520 l/min for VWS4.62 $\rm Q_{_N}$ 1520 l/min
Relative duty factor Prodection class Connection/Power supply Other electrical specifications set	100% DF (see data IP65 to EN 60529 Over device plug co ISO 4400/DIN 4365 se data sheet: 1.1-	sheet 1.1-430) nnection to 50 (2P+E) 115 (PI35V)	

1.1-130 (PI45V)

### TYPE CHARTS/DESIGNATIONS OF SYMBOLS



### CHARACTERISTICS oil viscosity v = 30 mm²/s



Q = f (p) Volume flow-pressure-characteristics



Q = f (p) Volume flow-pressure-characteristics



Q = f (I) Volume flow-signal-characteristics







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72 E-mail: sales@wandfluh.com 12 Internet: www.wandfluh.com Illustrations not obligatory Data subject to change



4/3-way valve VWS4.61 for  $Q_N 2,5...10$  l/min 4/3-way valve VWS4.62 for  $Q_N 2,5...10$  l/min



4/3-way valve VWS4.61 for  ${\rm Q}_{_{\rm N}}$  15…20 l/min 4/3-way valve VWS4.62 for Q<sub>N</sub> 15...20 l/min



4/2-way valve VWS4.61 for  $\mathrm{Q}_{_{\rm N}}\,15...20$  l/min 4/2-way valve VWS4.62 for  $Q_{\!\scriptscriptstyle N}^{'}$  15...20 l/min





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Illustrations not obligatory Data subject to change

4/2-way valve VWS4.61 for  $\rm Q_{\scriptscriptstyle N}\,$  2,5...10 l/min 4/2-way valve VWS4.62 for  $Q_N$  2,5...10 l/min





### PARTS LIST

Position	Article	Description
10	256.3454	Proportional solenoid PI35V-G24
	256.3426	Proportional solenoid PI35V-G12
15	256.4454	Proportional solenoid PI45V-G24
	256.4418	Proportional solenoid PI45V-G12
20	253.8000	Plug with integrated manual
		override HB4,5
25	253.8001	Plug with integrated manual
		override HB6
30	219.2001	Plug A (grey)
35	219.2002	Plug B (blac)
40	060.2200	Cover
45	058.4100	Cover
50	246.1161	Socket head cap screw M4x60 DIN 912
55	246.2160	Socket head cap screw M5x60 DIN 912
60	246.1111	Socket head cap screw M4 x 10 DIN 912
65	246.2117	Socket head cap screw M5x16 DIN 912
70	160.2093	O-ring ID 9,25x1,78

ACCESSORIES Sub-plates Proportional-amplifier

register 2.9 register 1.13

Explications techniques voir feuille 1.0-100



### **Proportional directional valve**

- pressure compensated
- Q<sub>max</sub> = 60 l/min
- p<sub>max</sub> = 250 bar

### DISCRIPTION

Directly controlled spool valve, actuated by a Wandfluh proportional solenoid (VDE standard 0580), in five chamber design. Wet solenoid in oil. Spools with precision machined oil passages control the oil volume wich is proportional to the solenoid current. Reduced pressure drop achieved by optimised flow channels. Precise spool fit, long life. Spool made of hardened steel, valve body made of high quality cast iron suitable for hydraulic valves. Flange type, threaded connection by means of a connecting plate.

### FUNCTION

Spool stroke, aperture and volume flow increase proportionally to the increase in the electric current at the proportional solenoid. This special design senses and compensales load induced flow changes. Flow remains constant with varying pressure. The optimised shape of the spool results in a good resolution of flowimportant for sensitive motion control. To control the valve Wandfluh proportional amplifiers are available (see register 1.13).

**NG10** 

ISO 4401-05



### APPLICATION

Because of the high resolution and low hysteresis, these valves are particularly suitable for demanding tasks. Applications:

handling operations, robots, actuators, remote controlled vehicles, tool making and paper production machines, in other words anywhere where precise control systems are needed.

Mineral oil, other fluid on request

(Required filtration grade ß6...10≥75)

Q<sub>N</sub> = 50 l/min

 $Q_N^{''} = 60 \text{ l/min}$ 

ISO 4406:1999, class 18/16/13

refer to data sheet 1.0-50/2

12 mm<sup>2</sup>/s...320 mm<sup>2</sup>/s -20...+70°C

 $p_{max} = 250 \text{ bar}$  $p_{max} = 100 \text{ bar}$  $Q_N = 30 \text{ l/min}$ 

Q<sub>N</sub> = 40 l/min

1 mA \*

≤ 1 % ∗

≤ 2 % \*

 $Q_{min}$  = 0,5 l/min

\* by optimal dithersignal

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### **TYPE CODE**

		VWS	4	-	-	TF -	#
Proportional control valve							
Number of control ports							
Symbol type see chart on page	2						
Nominal volume flows:							
$Q_{N} = 30 \text{ l/min} \qquad 30$ $Q_{N} = 40 \text{ l/min} \qquad 40$	Q <sub>N</sub> = 50 l/min Q <sub>N</sub> = 60 l/min		50 60				
Normally closed							
Standard nominal voltage $U_{N}$ :	12 VDC 24 VDC		G12 G24				

HYDRAULIC SPECIFICATIONS

Fluid

Contamination

Viscosity range

in port P, A, B

Fluid temperature

Working pressure

Min. volume flow

Resolution

Hysteresis

Repeatability

Tank pressure in port T

Nominal volume flows

efficiency

### **GENERAL SPECIFICATIONS**

Nominal size	NG10 acc. to ISO 4401-05
Designation	4/2-, 4/3-way proportional control valve
Construction	Direct operated spool valve
Mounting	Flange, 4 holes for socket cap
	screws M6x90
Fastening torque	M <sub>p</sub> = 9,5 Nm (screw quality 8.8)
Pipe connection	Connection plates, Multi-station flange
	subplate, Longitudinal stacking system
Mounting position	any, preferably horizontal
Ambient temperature	-20+50°C
Weight: 4/2-way	m = 5,5 kg
4/3-way	m = 6,9 kg

### **ELECTRICAL SPECIFICATIONS**

Construction	Proportional solenoid, wet pin push type,				
	pressure tight.				
Standard-Nominal voltage	U = 12 VDC	U = 24 VDC			
Limiting current	I <sub>G</sub> = 2300 mA	l <sub>g</sub> = 1150 mA			
Relative duty factor	100% DF (see data sheet 1.1-430)				
Protection class	IP 65 to EN 60 529				
Connection/Power supply	Over device plug connection				
	to ISO 4400/DIN 43650 (2P+E)				
Other electrical specifications see data sheet $1.1-155$ (PI60)/)					

Other electrical specifications see data sheet 1.1-155 (PI60V)

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### TYPE CHARTS / DESIGNATIONS OF SYMBOLS



#### CHARACTERISTICS oil viscosity v = 30 mm<sup>2</sup>/s Q = f(I) Volume flow-signal-characteristics Q [l/min] °0 10 20 30 40 50 60 70 80 90 100 [[%] Q = f (p) Volume flow-pressure-characteristics $Q_N = 30 \text{ l/min}$ Q [l/min] 250 p [bar] Q = f (p) Volume flow-pressure-characteristics $Q[l/min] Q_N = 40 l/min$ 250 p [bar] Q = f (p) Volume flow-pressure-characteristics Q [l/min] $Q_N = 50$ l/min 250 p [bar] Q = f (p) Volume flow-pressure-characteristics Q [l/min] $Q_N = 60$ l/min 250 p [bar]

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4/3-way valve



4/2-way valve





### PARTS LIST

Position	Article	Description
10	256.5454 256.5418	Proportional solenoid PI60V-G24-M40 Proportional solenoid PI60V-G12-M40
20	253.8002	Plug with integrated manual override HB8,5
30	219.2001	Plug A (grey)
35	219.2002	Plug B (black)
40	059.2205	Cover
50	246.3190	Socket head cap screw M6x90 DIN 912
60	246.3121	Socket head cap screw M6x20 DIN 912
70	160.2140	O-ring ID 14,00 x 1,78

### ACCESSORIES

Sub-plates Proportional-amplifier register 2.9 register 1.13

Technical explanation see data sheet 1.0-100



### Proportional spool valves

### **Proportional directional valve**

- not pressure compensated
- Q<sub>max</sub> = 8 l/min Q<sub>N</sub> = 5 l/min
- p<sub>max</sub> = 315 bar

### DESCRIPTION

Direct operated proportional spool valve in flange design NG3-Mini according to Wandfluh standard with 4 ports. The spool valve is designed 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 for long service life is painted. The cover and the solenoid are zinc coated.



**TYPE CODE** 

Proportional directional valve

Interface nominal size 3-Mini

Description of symbols acc. to table 1.10-65/2

Nominal flow at 10 bar pressure drop over 2 metering edges = 5 l/min

Standard nominal voltage U<sub>N</sub>: 12 VDC

Design-Index (Subject to change)

Flange construction

Proportionally to the solenoid current spool stroke, spool opening and valve volume flow will increase. Proportional directional valves NG3-Mini are not load-compensated. The optimum spool shape and progressive characteristics curve allow fine motion control. To control the valve Wandfluh proportional amplifiers are available (see register 1.13).

NG3-Mini



### APPLICATION

Proportional directional spool valves are well suited for demanding applications where high resolution, high volume flow and low hysteresis are requested. They are implemented in industrial hydraulics as well as in mobile hydraulics for the smooth control of hydraulic actuators. Mini-3 valves are used where both, reduced dimensions and weight are important. 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.

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#### **GENERAL SPECIFICATIONS**

Nomina	size	NG3-Mini acc. to Wandfluh standard		
Designa	ition	4/2-, 4/3-way prop. directional valve		
Constru	ction	Direct operated spool valve		
Mountin	g	Flange, 3 fastening holes for		
		socket head cap screws M4x30		
Fastenir	ng torque	2,8 Nm (qual. 8.8)		
Pipe cor	nnection	Connection plates		
		Multi-station flange subplate		
		Longitudinal stacking system		
Mountin	g position	any, preferably horizontal		
Ambient	t temperature	-20+50°C		
Weight:	1 solenoid-version	m = 0,5 kg		
	2 solenoid-version	m = 0,6 kg		

#### **ELECTRICAL SPECIFICATIONS**

Construction	Proportional solenoid, wet pin push type, pressure tight				
Standard-Nominal voltage	U = 12 VDC	U = 24 VDC			
Limiting current	I <sub>G</sub> = 1080 mA	l <sub>g</sub> = 540 mA			
Relative duty factor	100% DF (see data sheet 1.1-430)				
Protection class	IP 65 acc. to EN 60 529				
Connection/Power supply	Over device plug connection acc. to				
	ISO 4400/DIN 43650 (2P+E)				
Other electrical specifications see data sheet 1.1-90 (Pl29V)					

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### HYDRAULIC SPECIFICATIONS

24 VDC

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13
	(Required filtration grade ß $610 \ge 75$ ) refer to data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20+70°C
Working pressure	p <sub>max</sub> = 315 bar (connection P, A, B)
Tank pressure	$p_{max} = 160$ bar (connection T)
Nominal volume flow	Q <sub>N</sub> = 5 l/min at 10 bar
	pressure drop over 2 metering edges
Max. volume flow	Q <sub>max</sub> = 8 l/min
Leakage volume flow	see characteristic
Hysteresis	≤ 5 % *
	* by optimal dithersignal

G12

G24



ADB - V

### **TYPE CHARTS / DESIGNATIONS OF SYMBOLS**







Q [l/min] 12 10 8 | = | <sub>G</sub> 6 4 2 0 50 100 250 300 p [bar] 0 150 200

### PARTS LIST

Position	Article	Description
10 256.2418	256.2453 Proportiona	Proportional solenoid Pl29V-G24 I solenoid Pl29V-G12
20	253.8000 override HB	Plug with integrated manual 4,5
30	219.2001	Plug A (grey)
35	219.2002	Plug B (black)
40	056.4100	Cover
50	246.0141	Socket head cap screw M3x40 DIN 912
60	246.0109	Socket head cap screw M3x8 DIN 912
70	160.2045	O-ring ID 4,50x1,5

### ACCESSORIES

Sub-plates Proportional-amplifier

Technical explanation see data sheet 1.0-100E



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Register 2.9

Register 1.13

Illustrations not obligatory Data subject to change

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> Data sheet no. 1.10-65E 2/2 Edition 11 02



### Proportional directional control valve

- Integrated amplifier
- Integrated spool position control with LVDT
- Direct operated, not pressure compensated
- Q<sub>max</sub> = 20 l/min
- $Q_N = 8$  l/min
- $p_{max} = 315 \text{ bar}$

### DESCRIPTION

Direct operated proportional spool valve with integrated electronics in flange design NG4-Mini acc. to Wandfluh standard with 4 ports. The valve possesses an integrated positional control of the valve spool. This assures a minimal hysteresis and improved dynamic characteristics. 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 Wandfluh proportional solenoids (VDE standard 0580). Low pressure drop due to the body design and spool profiling. The spool is made of hardened steel. The body made of high grade hydraulic casting is painted. The solenoids are zinc coated and the housing for the elctronics is made of aluminium.

### FUNCTION

With the integrated spool position sensor (LVDT) the actual position of the spool is continuously recorded and made to follow the setpoint value transmitted in an analogue manner. By means of this internal positional control, a minimal hysteresis and excellent dynamic characteristics are assured. With an increasing set-point value signal, the valve opening and therefore the volume flow increases and vice versa. Parameter setting and diagnosis with the free-of-charge software «PASO». Data are stored in a non volatile memory. Even after an electric power failure settings can easily be reproduced and transmitted.

NG4-Mini®



#### APPLICATION

Proportional directional control valves with integrated electronics are highly suitable for demanding applications thanks to a high resolution, large volume flow, minimal hysteresis and very good dynamic characteristics. They are implemented in systems calling for good valveto-valve reproducibility, easy installation, comfortable operation and high precision in industrial hydraulics as well as in mobile hydraulics for the smooth control of actuators. Application examples: pitch control of wind generators, forest and earth moving machines, machine tools and paper production machines with position controls, robotics and fan control.

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### TYPE CODE

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Interface					Τ		_				
With integrated electronics and po	sition conti	rol									
Proportional directional valve											
Control mode acc. to table 1.10-70	)/2										
Number of control ports											
Designation of symbols acc. to tak	ole 1.10-70	/2									
Nominal volume flow Q <sub>N</sub> :	4 l/min 8 l/min	4									
Standard nominal voltage U <sub>N</sub> :	24 VDC							_			
Hardware configuration: With analog signal (-10+10 V fa With CANopen acc. to DSP-408 With Profibus DP acc. to Fluid Pov	ctory set) wer Techno	logy			A C P	2					
Design-Index (Subject to change)	)										

### **GENERAL SPECIFICATIONS**

OLIVERAL OF LC			
Designation	4/3-way proportional valve with integrated electronics	Ambient temperature	-20+65 °C (typical) (The upper temperature limit is a guideline value for typical
Nominal size	NG4-Mini acc. to Wandfluh standard		The electronics of the valve limit the power in case of a too
Construction	Direct operated spool valve		high electronics temperature. More detailed information can
Operations	NG4-Mini acc. to Wandfluh standard Direct operated spool valve Proportional solenoid, wet pin push type, pressure tight Flange, 3 fixing holes for	Mounting position	be obtained from the operating instructions «DSV».) any, preferably horizontal
Mounting	Flange, 3 fixing holes for socket head cap screws M5x40	Fastening torque Weight	$M_{D} = 5,5 \text{ Nm} (\text{quality 8.8})$ m = 1,95 kg
Connections	Threaded connection plates, multi-flange subplates, longitudinal stacking system		

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### TYPE CHARTS/DESIGNATIONS OF SYMBOLS

$\begin{array}{c c}                                    $	$a \underbrace{ \begin{array}{c} A \\ \hline $	S 4 D41 S = Symmetrical control mode	
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#### HYDRAULIC SPECIFICATIONS

Fluid Contamination efficiency

Viscosity range

Tank pressure

Hysteresis

Repeatability

Jump response

Fluid temperature

Working pressure

Max. volume flow

Nominal volume flow

Leakage volume flow

Frequency response

Mineral oil, other fluid on request ISO 4406:1999, class 18/16/13 (Required filtration grade  $\beta 6...10 \ge 75$ ) refer to data sheet 1.0-50/2 12 mm<sup>2</sup>/s...320 mm<sup>2</sup>/s -20...+70°C p<sub>max</sub> = 315 bar (connections P, A, B)  $p_{max} = 160 \text{ bar} (\text{connections T})$  $Q_N = 4$  l/min, 8 l/min see characteristic on request < 0,4 % < 0,4 % typically 25 ms from 10 to 90 % see characteristics

### **ELECTRICAL SPECIFICATIONS**

Protection class	IP 67 acc. to EN 60 529
	with suitable connector and closed
	electronic housing
Supply voltage	24 VDC
Ramps	separate adjustment for up and
	down for each solenoid
Parameterisation	via fielbus or USB
Interface	USB (Mini B) for parameterisation with
	«PASO»
	(under the closing screw of the housing cover, factory set parameters)
Analog interface:	
Device receptacle (male)	M23, 12-poles
Mating connector	Plug (female) M23 12-poles
	(not incl. in delivery)
Preset value signal:	Voltage/current selected with software

M12, 4-poles

(not incl. in delivery)

(not incl. in delivery)

(not incl. in delivery)

Fieldbus

Plug (female), M12, 4-poles

M12, 5-poles (acc. to DRP 303-1)

Plug (female), M12, 5-poles

M12, 5-poles, B-codiert (acc. to IEC 947-5-2)

Plug (male), M12, 5-poles, B-codet

Fieldbus interface: Device receptacle supply (male) Mating connector

Device receptacle CANopen (male) Mating connector

Device receptacle Profibus (female) Mating connector

Preset value signal:



### NOTE!

Detailed electrical characteristics and description of «DSV» electronics are shown on data sheet 1.13-75.



### START-UP

Normally there is no need to adjust settings by the customer. The connectors have to be wired according to the chapter «Connector wiring diagram»

Axis controllers will be supplied configurated as amplifiers. Switching into controller mode and setting of the adjustments of the controller must be done by the customer using the set-up software (Serial interface.)

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

1

2

3

6

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

### CONNECTOR WIRING DIAGRAM

#### Analog interface:

#### Device receptacle (male) X1



- = Supply voltage + = Supply voltage 0 VDC
- = Stabilised output voltage
- 4 = Preset value voltage +
- 5 = Preset value voltage -
  - = 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. Factory setting: Voltage (-10...+10 V), (PIN 4/5)

### Fieldbus interface:

#### Device receptacle supply (male) X1



- 1 = Supply voltage +
- 2 = Reserved for extensions
- 3 = Supply voltage 0 VDC

### Device receptacle CANopen (male) X3

### CAN 1 = not connected





(female) X3



PROFIBUS

**Device receptacle Profibus** 

# Parameterisation interface (USB, Mini B) X2

Under the closing screw of the housing cover

5

3

### NOTE! The mating connetor and the cable to adjust the set-



tings are not part of the delivery. To order the cable, look up the article no. in the chapter «Accessories».

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Illustrations not obligatory Data subject to change



350 p [bar]

350 p [bar]

100 x [%]

76 100 s[%]

200

200

20 40 60 80

4 28 52

1 

≯∣ T

250

250

300

300



All values measured over 2 metering edges, A and B

0.5

1 Signal amplitude 90% ..... Signal amplitude 10%

-9

0,1

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5 10 n

50

100 Frequency [Hz]

E-mail: sales@wandfluh.com Internet: www.wandfluh.com

Illustrations not obligatory Data subject to change





### With fieldbus interface







### NOTE!

The cable connector is not part of the delivery. The dimensions refer to those of the cable connector in the chapter «Accessories».

### PARTS LIST

Position	Article	Description
20	062.0102	Cover
21	223.1317	Dummy plug M16x1,5
22	160.6131	O-ring ID 13,00x1,5
30	072.0021	Gasket 33x2x59,9x2
40	208.0100	Socket head cap screw M4x10
50	246.1161	Socket head cap screw M4x60 DIN 912
55	246.1191	Socket head cap screw M4x100 DIN 912
60	160.2052	O-ring ID 5,28x1,78

### ACCESSORIES

<ul> <li>Set-up software</li> </ul>	see start-up
Cable to adjust the settings through interface (from plug type A to Mini B, 3m)	e USB article no. 219.2896
<ul> <li>Cable connector for analog interface: <ul> <li>straight, soldering contact</li> <li>90°, soldering contact</li> </ul> </li> <li>Recommended cable size: <ul> <li>Outer diameter 910,5 mm</li> <li>Single wire max. 1 mm<sup>2</sup></li> <li>Recommended wire size:</li> </ul> </li> </ul>	article no. 219.2330 article no. 219.2331

- Recommended wire size:  $0...25 \text{ m} = 0,75 \text{ mm}^2 (AWG18)$ 

 $25...50 \text{ m} = 1 \text{ mm}^2 \text{ (AWG17)}$ 

Technical explanation see data sheet 1.0-100

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### Proportional spool valves

## Proportional directional valve

- not pressure compensated
- Q<sub>max</sub> = 20 l/min
- Q<sub>N max</sub> = 12 l/min
- p<sub>max</sub> = 350 bar

### DESCRIPTION

Direct operated proportional spool valve in flange design NG4-Mini Interface to Wandfluh standard with 4 ports. The spool valve is designed to the 5 chamber principle. The volume flow is adjusted by a slip-on coil acc. to VDE 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 for long service life is painted. The armature tube and the plug crew are zinc coated. The solenoid coil is zinc-/nickel-coated.



NG4-Mini<sup>®</sup>

### FUNCTION

Proportionally to the solenoid current spool stroke, spool opening and valve volume flow will increase. Proportional directional valves NG4-Mini are not load-compensated. The optimum spool shape and progressive characteristics curve allow fine motion control. To control the valve Wandfluh proportional amplifiers are available (see register 1.13).



### APPLICATION

Proportional directional spool valves are well suited for demanding applications where high resolution, high volume flow and low hysteresis are requested. They are implemented in industrial hydraulics as well as in mobile hydraulics for the smooth control of hydraulic actuators. 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

		WDPF	A04 -		- 🗆 - 🗆	- [	/	] - [		#	
Proportional directional valve											
Flange construction											
Mounting interface acc. to Wandflu	h standard, NG4-N	/lini									
Description of symbols acc. to table	e 1.10-73/2										
Nominal volume flow $Q_{_{\rm N}}$	4 l/min 8 l/min 12 l/min	4 8 12	2								
Standard nominal voltage $U_{\rm N}$	2 without solen	12 VDC G1 24 VDC G2 oid coil X	12 24 5								
Slip-on coil	Metal housing ro Metal housing so	und with on Juare with o	ie-sided ne-sided	collar d collar	V N*		_				
Electric connection	Connector socke Connector socke Connector Deuts	t EN 17530 t AMP Juni ch DT04-2F	01-803 / ior-Time >	ISO 44( r	)0 D J G						
Sealing material	NBR FKM (Viton)	D1						1			
Manual override	Integrated Push-button Spindle			H	F1 S1				-		
Design-Index (Subject to change)											

\* Only available in conjunction with other nominal voltages and connection versions. (See data sheet 1.1-175)

### **GENERAL SPECIFICATIONS**

Nominal size	NG4-Mini to Wandfluh standard	Ambient temperature	-20+70 °C (slip-on coil «V»)
Designation	Direct operated proportional spool valve		if > +50 °C, then $I_{c}$ - 10%
Construction	Direct operated spool valve		-20…+70 °C (slip-on coil «N»)
Betätigungsart	Proportional solenoid	Mounting position	any, preferably horizontal
Mounting	Flange, 3 fixing holes for socket head cap screws M5x40	Fastening torque	$M_{D}$ = 5,5 Nm (screw quality 8.8) for fixing screws
Connections	Connection plates Multi-station flange subplate Longitudinal stacking system		$M_{p}$ = 5 Nm for knurled nut

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Mineral oil, other fluid on request

ISO 4406:1999, class 18/16/13 (Required filtration grade ß  $6...10 \ge 75$ )

refer to data sheet 1.0-50/2 12 mm²/s...320 mm²/s -20...+70 °C

### **ELECTRICAL SPECIFICATIONS**

Construction	Proportional solenoid, wet pin push						
	type, pressure tight						
Standard-Nominal voltage	U <sub>N</sub> = 12 VDC	U <sub>N</sub> = 24 VDC					
Limiting current	I <sub>G</sub> = 1200 mA	I <sub>G</sub> = 630 mA					
Relative duty factor	100% DF (see data	sheet 1.1-430)					
Protection class	Connection version						
to EN 60529	D:IP 65						
	J: IP 66						
	G:IP 67 and 69K						
Connection/Power supply C	Over device plug con	nection					
Other electrical specification	ns see data sheet	1.1-168 (V)					
		1.1-1/5 (N)					

#### 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 (infinitely variable valve actuation)

### **TYPE CHARTS / DESIGNATIONS OF SYMBOLS**

		frending pressure	
		in port P, A, B	p <sub>max</sub> = 350 bar (p <sub>⊤</sub> <20 bar)
			p <sub>max</sub> = 315 bar (p <sub>⊤</sub> >20 bar)
(		Tank pressure	
СС	nnection	in port T	р <sub>т max</sub> = 160 bar
		Nominal volume flow	Q <sub>N</sub> =4 I/min, 8 I/min, 12 I/min
t	1.1-168 (V)	Max. volume flow	see characteristic
	1.1-175 (N)	Leakage volume flow	on request
		Hysteresis	≤5% *
		<b>,</b>	* at optimal dither signal

Viscosity range Fluid temperature Working pressure

Fluid

HYDRAULIC SPECIFICATIONS

Contamination efficiency

Weight		
4/3-way	m = 1,25 kg	
4/2-way (1 solenoid)	m = 0,9 kg	

$\begin{array}{c c} A & B \\ \hline \\$	ACB - S S = Symmetrical control mode		ACB - V V = Meter-in control mode
	AC1 - S S = Symmetrical control mode		AC1 - V V = Meter-in control mode
$ \begin{array}{c} A & B \\ & & \\ & & \\ \hline \begin{matrix} 1 & 1 & 4 & k \\ T & T & V & V \\ \hline P & T \end{array} $	CB2 - S S = Symmetrical control mode	$ \begin{array}{c} A & B \\ \hline 1 & 1 & A \\ \hline T & T & W \\ P & T \end{array} $	CB2 - V V = Meter-in control mode
$\begin{array}{c c} A & B \\ \hline & & \\$	ACB - R R = Meter-out control mode		ADB - V V = Meter-in control mode
	AC1 - R R = Meter-out control mode		AD1 - V V = Meter-in control mode
$ \begin{array}{c} A & B \\ & & \\ & & \\ \hline \begin{matrix} 1 & 1 & 4 & \\ T & T & V \\ \hline P & T \end{array} $	CB2 - R R = Meter-out control mode	$ \begin{array}{c} A \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	DB2 - V V = Meter-in control mode

Γ



### CHARACTERISTICS oil viscosity v = 30 mm<sup>2</sup>/s





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

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Illustrations not obligatory Data subject to change



4/3-way valve

### PARTS LIST

Position	Article	Description
10	206.2	V.E37/19x50
50	160.2052 160.6052	O-ring ID 5,28x1,78 (NBR) O-ring ID 5,28x1,78 (FKM)
60	160.2187 160.6187	O-ring ID 18,72x2,62 (NBR) O-ring ID 18,72x2,62 (FKM)
70	154.2700	Knurled nut
80	253.7001	Push-button HF1
90	253.7000	Spindle HS1



### ACCESSORIES

4/2-way valve

Threaded connecting plates, Multi-flange subplates and Longitudinal stacking system see Reg. 2.9 Proportional amplifier see Reg. 1.13 Mating connector (A) EN175301-803 article no. 219.2001 Mating connector (B) EN 175301-803 article no. 219.2002

Technical explanation see data sheet 1.0-100



## Proportional directional valve

- not pressure compensated
- Q<sub>max</sub> = 20 l/min
- Q<sub>N max</sub> = 12 l/min
- p<sub>max</sub> = 350 bar

### DESCRIPTION

Direct operated proportional spool valve in flange design NG4 to ISO 4401-02 with 4 ports. The spool valve is designed to the 5 chamber principle. The volume flow is adjusted by a slip-on coil acc. to VDE 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 for long service life is painted. The armature tube and the plug crew are zinc coated. The solenoid coil is zinc-/nickel-coated.

### FUNCTION

Proportionally to the solenoid current spool stroke, spool opening and valve volume flow will increase. Proportional directional valves NG4 ISO 4401-02 are not load-compensated. The optimum spool shape and progressive characteristics curve allow fine motion control. To control the valve Wandfluh proportional amplifiers are available (see register 1.13).

NG4

ISO 4401-02



### APPLICATION

Proportional directional spool valves are well suited for demanding applications where high resolution, high volume flow and low hysteresis are requested. They are implemented in industrial hydraulics as well as in mobile hydraulics for the smooth control of hydraulic actuators. 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

		WDF	P F B04	-	- 🗌 - 🗆	[	/		] - [		#	
Proportional directional valve			-									
Flange construction												
International standard interface ISC	), nominal size 4											
Description of symbols acc. to table	e 1.10-74/2											
Nominal volume flow $Q_{_{\rm N}}$	4 l/min 8 l/min 12 l/min		4 8 12									
Standard nominal voltage ${\rm U}_{\rm _N}$	without sole	12 VDC 24 VDC noid coil	G12 G24 X5									
Slip-on coil	Metal housing ro Metal housing s	ound witl quare wi	h one-side	ed collar ded collar	V N*		_					
Electric connection	Connector sock Connector sock Connector Deut	et EN 17 et AMP sch DT0	75301-80 Junior-Tir 4-2P	3 / ISO 44 ner	00 D J G			-				
Sealing material	NBR FKM (Viton)	D1										
Manual override	Integrated Push-button Spindle				HF1 HS1							
Design-Index (Subject to change)										]		

\* Only available in conjunction with other nominal voltages and connection versions. (See data sheet 1.1-175)

### **GENERAL SPECIFICATIONS**

Nominal size	NG4 to ISO 4401-02	Ambient temperature	-20+70 °C (slip-on coil «V»)
Designation	Direct operated proportional spool valve		if > +50 °C, then $I_{c}$ - 10%
Construction	Direct operated spool valve		-20…+70 °C (slip-on coil «N»)
Betätigungsart	Proportional solenoid	Mounting position	any, preferably horizontal
Mounting	Flange, 4 fixing holes for socket head cap screws M5x40	Fastening torque	$M_{D}$ = 5,5 Nm (screw quality 8.8) for fixing screws
Connections	Connection plates Multi-station flange subplate Longitudinal stacking system		$M_p = 5 \text{ Nm for knurled nut}$

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### ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push					
	type, pressure tight					
Standard-Nominal voltage	U <sub>N</sub> = 12 VDC	U <sub>N</sub> = 24 VDC				
Limiting current	I <sub>G</sub> = 1200 mA	I <sub>G</sub> = 630 mA				
Relative duty factor Protection class to EN 60529	100% DF (see data s Connection version D:IP 65 J: IP 66 G:IP 67 and 69K	sheet 1.1-430)				
Connection/Power supply Over device plug connection						
Other electrical specification	ns see data sheet	1.1-168 (V) 1.1-175 (N)				

### 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 (infinitely variable valve actuation)

### TYPE CHARTS / DESIGNATIONS OF SYMBOLS

HYDRAULIC	SPECIFICATIONS
Fluid	Mine

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13
	(Required filtration grade ß610≥75)
	refer to data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20+70°C
Working pressure	
in port P, A, B	p <sub>max</sub> = 350 bar
Tank pressure	
in port T	р <sub>т max</sub> = 160 bar
Nominal volume flow	Q <sub>N</sub> = 4 I/min, 8 I/min, 12 I/min
Max. volume flow	see characteristic
Leakage volume flow	on request
Hysteresis	$\leq$ 5 %*
	* at optimal dither signal

Weight		
4/3-way	m = 1,25 kg	
4/2-way (1 solenoid)	m = 0,9 kg	

$\begin{array}{c c} A & B \\ \hline \\$	ACB - S S = Symmetrical control mode	$\begin{array}{c c} A & B \\ \hline & & \\ \hline \\ \hline$	ACB - V V = Meter-in control mode
	AC1 - S S = Symmetrical control mode		AC1 - V V = Meter-in control mode
$ \begin{array}{c} A & B \\ & & \\ & & \\ \hline \begin{matrix} 1 & 1 & A & M \\ T & T & M & V \\ \hline P & T \end{array} $	CB2 - S S = Symmetrical control mode	$ \begin{array}{c} A & B \\ \hline 1 & 1 & A \\ \hline 1 & T & T \\ \hline Y & T \\ P & T \end{array} $	CB2 - V V = Meter-in control mode
$\begin{array}{c c} A & B \\ \hline & & & \\ \hline \\ \hline$	ACB - R R = Meter-out control mode		ADB - V V = Meter-in control mode
	AC1 - R R = Meter-out control mode		AD1 - V V = Meter-in control mode
$ \begin{array}{c} A & B \\ & & \\ & & \\ \hline \begin{matrix} 1 & 1 & A & \\ T & T & V \\ \hline P & T \end{array} $	CB2 - R R = Meter-out control mode	$ \begin{array}{c} A \\ \hline M \\ T \\ T \\ P \\ T \end{array} $	DB2 - V V = Meter-in control mode

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### **CHARACTERISTICS** oil viscosity $\upsilon$ = 30 mm<sup>2</sup>/s





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Illustrations not obligatory Data subject to change Data sheet no. **1.10-74E** 3/4 Edition 13 09







PA	RT	S	LIS	Т

Position	Article	Description				
10	206.2	V.E37/19x50				
50	160.2060 160.6061	O-ring ID 6,07x1,78 (NBR) O-ring ID 6,07x1,78 (FKM)				
60	160.2076 160.6076	O-ring ID 7,65x1,78 (NBR) O-ring ID 7,65x1,78 (FKM)				
70	160.2187 160.6187	O-ring ID 18,72x2,62 (NBR) O-ring ID 18,72x2,62 (FKM)				
80	154.2700	Knurled nut				
90	253.7001	Push-button				
100	253.7000	Spindle				

### ACCESSORIES

Threaded connecting plates, Multi-flange subplates and Longitudinal stacking system Proportional amplifier Mating connector (A) EN175301-803 art Mating connector (B) EN 175301-803 art

see Reg. 2.9 see Reg. 1.13 article Nr. 219.2001 article Nr. 219.2002

Technical explanation see data sheet 1.0-100



## Proportional directional valve

- not pressure compensated
- Q<sub>max</sub> = 42 l/min
- $Q_{N \max}^{IIII ax} = 32 I/min$
- p<sub>max</sub> = 350 bar

### DESCRIPTION

Direct operated proportional spool valve in flange design NG6 acc. to ISO 4401-03/7790 with 4 ports. The spool valve is designed 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 for long service life is painted. The armature tube and the plug crew are zinc coated. The solenoid coil is zinc-/ nickel-coated.

### FUNCTION

Proportionally to the solenoid current spool stroke, spool opening and valve volume flow will increase. Proportional directional valves NG6 are not load-compensated. The optimum spool shape and progressive characteristics curve allow fine motion control. To control the valve Wandfluh proportional amplifiers are available (see register 1.13).

NG6

ISO 4401-03



### APPLICATION

Proportional directional spool valves are well suited for demanding applications where high resolution, high volume flow and low hysteresis are requested. They are implemented in industrial hydraulics as well as in mobile hydraulics for the smooth control of hydraulic actuators. 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

	WDF	PFA06 - [		/	 #
Spool valve		-			
Direct operated					
Proportional					
Flange construction					
International standard interface ISC	), nominal size 6				
Description of symbols acc. to table	e 1.10-77/2				
Nominal volume flow $Q_{_{\rm N}}$	5 l/min         5           10 l/min         10           16 l/min         16           32 l/min         32				
Standard nominal voltage $U_{_N}$	12 VDC 24 VDC without solenoid coil	G12 G24 X5			
Slip-on coil	Metal housing, round Metal housing, square	W M*			
Electric connection	Connector socket EN 17 Connector socket AMP C Connector Deutsch DT0	5301-803 / ISO 4 Junior-Timer 4-2P	1400 D J G		
Sealing material	NBR D1				
Manual override	Integrated Push-button Spindle		HF1 HS1		
Design-Index (Subject to change)					

\* Only available in conjunction with other nominal voltages and connection versions (see data sheet 1.1-181)

#### **GENERAL SPECIFICATIONS**

Nominal size Designation	NG6 acc. to ISO 4401-03 / Direct operated proportiona	7790 I spool valve	Ambient temperature	-20+70 °C (slip-on coil «W») if > +50 °C, then I <sub>G</sub> - 10% -20 +70 °C (slip-on coil «*M»)	
Operation         Proportional solenoid           Mounting         Flange, 4 fixing holes for socket head cap screws M5x50		x50	Mounting position Fastening torque	any, preferably horizontal M <sub>D</sub> = 5,5 Nm (screw quality 8.8) for fixing screws	
Connections	Connection plates Multi-station flange subplate Longitudinal stacking syster	e m		$M_p = 7 \text{ Nm}$ for knurled nut	
Weight					
4/3-way	m = 2,0 kg				
4/2-way (1 solenoid)	m = 1,5 kg				
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### **ELECTRICAL SPECIFICATIONS**

Construction	Proportional solenoid, wet pin push type, pressure tight				
Standard-Nominal voltage	$U_{\rm N} = 12 \text{ VDC}$	$U_N = 24 \text{ VDC}$			
Relative duty factor	100% DF (see data sheet 1.1-430)				
Protection class to FN 60529	Connection version				
	J: IP 66				
Connection/Power supply	Over device plug con	inection			
Coil versions	I versions W.E45/23x50 (data sheet 1.1-182)				
Other electrical specificatio	ns see data sheet 1.1	I-182 (W)			
	1.1	I-181 (M)			

### HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13
-	(Required filtration grade $\& 610 \ge 75$ )
	refer to data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20+70°C
Working pressure	
in port P, A, B	p <sub>max</sub> = 350 bar
Tank pressure	- max
in port T	p <sub>T max</sub> = 250 bar
Nominal volume flow	Q <sub>N</sub> = 5 l/min, 10 l/min, 16 l/min, 32 l/min
Max. volume flow	see characteristic
Leakage volume flow	on request
Hysteresis	≤ 5 % *
-	<ul> <li>at optimal dither signal</li> </ul>

### 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 (infinitely variable valve actuation)

### TYPE CHARTS / DESIGNATIONS OF SYMBOLS

	ACB - S		ADB - V
aL <u>X I#N I⊤ ⊤IN VI</u> X Ib P T	S = Symmetrical control mode	a <u>X</u> <u>I</u> <u>π</u> <u>I</u> <u>Γ</u> <u>I</u> <u>Γ</u> <u>I</u> <u>Γ</u> <u>I</u> <u>Γ</u> <u>I</u>	V = Meter-in control mode
$a \underbrace{ \begin{array}{c} A \\ a \\ \hline \end{array} \\ P \\ T \\ \hline \end{array} \\ \hline \end{array} \\ \hline \\ P \\ T \\ \hline \\ \hline \\ P \\ T \\ \hline \\ \\ \end{array} \\ W b$	AC1 - S S = Symmetrical control mode		
$a \bigvee \bigvee \begin{bmatrix} A & B \\ T & T & b \\ T & T & V \\ T & T & T \\ T & T & T \\ T & T & T \\ T & T &$	CB2 - S S = Symmetrical control mode		



### CHARACTERISTICS oil viscosity v = 30 mm<sup>2</sup>/s



0 20 40 60



0 -100 -80 -60 -40 -20 80 100 [[%] 0 20 40 60

### Legend:

**1:**  $Q_N = 5 \text{ l/min}$ **2:**  $Q_N = 10 \text{ l/min}$ 

**3**:  $Q_N = 16 I/min$ **4**:  $Q_N = 32 I/min$ 



5

80 100 L[%]

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

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Data sheet no. 1.10-77E 3/4 Edition 12 47



4/3-way valve

4/2-way valve



### PARTS LIST

Position	Article	Description
10	206.1	W.E45/23x50
50	160.2093 160.6092	O-ring ID 9,25x1,78 (NBR) O-ring ID 9,25x1,78 (FKM)
60	160.2222 160.6222	O-ring ID 22,22x2,62 (NBR) O-ring ID 22,22x2,62 (FKM)
70	154.2701	Knurled nut
80	253.7004	Push-button
90	253.7002	Spindle



### ACCESSORIES

Threaded connecting plates, Multi-flange subplatesand Longitudinal stacking systemsee Reg. 2.9Proportional amplifiersee Reg. 1.13Mating connector (A) EN175301-803article no. 219.2001Mating connector (B) EN 175301-803article no. 219.2002

Technical explanation see data sheet 1.0-100



### Proportional directional control valve

- Integrated amplifier or controller electronics
- Integrated spool position control with LVDT
- Direct operated, not pressure compensated
- Q<sub>max</sub> = 50 l/min
- $Q_N = 40 \text{ l/min}$
- p<sub>max</sub> = 350 bar

### DESCRIPTION

CONTENT

Direct operated proportional spool valve with integrated electronics in flange design NG6 acc. to ISO 4401-03/7790 with 4 ports. The valve possesses an integrated positional control of the valve spool. This assures a minimal hysteresis and improved dynamic characteristics. 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 Wandfluh proportional solenoids (VDE standard 0580). Low pressure drop due to the body design and spool profiling. The spool is made of hardened steel. The body made of high grade hydraulic casting is painted. The solenoids are zinc coated and the housing for the elctronics is made of aluminium.



#### FUNCTION

With the integrated spool position sensor (LVDT) the actual position of the spool is continuously recorded and made to follow the setpoint value transmitted in an analogue manner. By means of this internal positional control, a minimal hysteresis and excellent dynamic characteristics are assured. With an increasing set-point value signal, the valve opening and therefore the volume flow increases and vice versa. Parameter setting and diagnosis with the free-of-charge software «PASO». Data are stored in a non volatile memory. Even after an electric power failure settings can easily be reproduced and transmitted. These valves are available with an integrated controller as an option. As feedback signal source sensors with voltage or current output signal can be directly connected. The available controller structure has been optimised for applications with hydraulic actuators.



### APPLICATION

Proportional directional control valves with integrated electronics are highly suitable for demanding applications thanks to a high resolution, large volume flow, minimal hysteresis and very good dynamic characteristics. 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 position controls, robotics and fan control

CONTENT	
GENERAL SPECIFICATIONS	1
TYPE CHARTS/ DESIGNATIONS OF SYMBOLS	2
HYDRAULIC SPECIFICATIONS	2
ELECTRICAL SPECIFICATIONS	2
START-UP	2
CONNECTOR WIRING DIAGRAM	2
CHARACTERISTICS	3
DIMENSIONS	4
PARTS LIST	4
ACCESSORIES (not incl. in the delivery)	4

#### TYPE CODE



<b>GENERAL SPEC</b>	CIFICATIONS					
Designation	4/3-way proportional valve with integrated electronics	Ambient temperatur	eline value for typical			
Nominal size	NG6-Mini acc. to ISO 4401-03/7790		applications, in individual cases it may also be higher or lower. The electronics of the valve limit the power in case of a too			
Construction	Direct operated spool valve		high electronics temperature. More de	etailed information can		
Operations Proportional solenoid, wet pin push type, pressure tight Mounting Flange, 4 fixing holes for socket head cap screws M5x50		Mounting position	be obtained from the operating instructions «DSV».) any, preferably horizontal			
		Fastening torque Weight	M <sub>D</sub> = 5,5 Nm (quality 8.8) m  = 3,3 kg			
Connections	Threaded connection plates, multi-flange subplates, longitudinal stacking system					
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### TYPE CHARTS/DESIGNATIONS OF SYMBOLS



#### HYDRAULIC SPECIFICATIONS

Fluid

Mineral oil, other fluid on request Contamination efficiency ISO 4406:1999, class 18/16/13 (Required filtration grade  $\beta 6...10 \ge 75$ ) refer to data sheet 1.0-50/2 12 mm<sup>2</sup>/s...320 mm<sup>2</sup>/s Viscosity range -20...+70°C Fluid temperature p<sub>max</sub> = 350 bar (connections P, A, B) Working pressure  $p_{max} = 160 \text{ bar} (\text{connections T})$ Tank pressure Q<sub>N</sub> = 5 l/min, 10 l/min, 16 l/min, 32 l/min, Nominal volume flow 40 l/min Max. volume flow see characteristic Leakage volume flow on request Hysteresis < 0,4 % Repeatability < 0,4 % typically 25 ms from 10 to 90 % Jump response Frequency response see characteristics **ELECTRICAL SPECIFICATIONS** 

## Protection class

IP 67 acc. to EN 60 529 with suitable connector and closed electronic housing Supply voltage 24 VDC separate adjustment for up and Ramps (amplifier only) down for each solenoid preset value speed adjustable Preset value generator (controller only) via fielbus or USB Parameterisation USB (Mini B) for parameterisation

with «PASO» (under the closing screw of the housing cover, factory set parameters)

M23, 12-poles Plug (female), M23, 12-poles (not incl. in delivery) Voltage/current selected with software

M12, 4-poles Plug (female), M12, 4-poles (not incl in delivery)

M12, 5-poles (acc. to DRP 303-1) Plug (female), M12, 5-poles (not incl. in delivery)

M12, 5-poles, B-codiert (acc. to IEC 947-5-2) Plug (male), M12, 5-poles, B-codet (not incl. in delivery) Fieldbus



Interface

Analog interface

Mating connector

Preset value signal:

Fieldbus interface:

Device receptacle supply (male)

Mating connector

Device receptacle

CANopen (male)

Mating connector

Device receptacle

Profibus (female)

Mating connector

Preset value signal:

Device receptacle (male)

NOTE!

Detailed electrical characteristics and description of «DSV» electronics are shown on data sheet 1.13-75.

### START-UP

Normally there is no need to adjust settings by the customer. The connectors have to be wired according to the chapter «Connector wiring diagram».

Controllers will be supplied configurated as amplifiers. Switching into controller mode and setting of the adjustments of the controller must be done by the customer using the set-up software (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 protocol with device profile DSP-408 for «DSV».

#### CONNECTOR WIRING DIAGRAM

### Analog interface:

Device receptacle (male) X1



- 1 = Supply voltage + = Supply voltage 0 VDC

  - = Stabilised output voltage
  - = Preset value voltage +
- 5 = Preset value voltage -
  - = Preset value current +
  - = 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.

Factory setting: Voltage (-10...+10 V), (PIN 4/5)

#### Fieldbus interface:

3

### Device receptacle supply (male) X1

MAIN



2 = Reserved for extensions

3 = Supply voltage 0 VDC

4 = Chassis

#### Device receptacle CANopen (male) X3

### CAN

### **Device receptacle Profibus** (female) X3

PROFIBUS



1 = VP 2 = RxD / TxD - N⁄2 5 3 = DGND4 = RxD / TxD - P5 = Shield

Parameterisation interface (USB, Mini B) X2

Under the closing screw of the housing cover

### Feedback signal interface

Device receptacle Sensor (female) X4 (controller only)



2 = Feedback signal +

1 = Supply voltage (output) +

- 3 = Supply voltage 0 VDC
- 4 = not connected
- 5 = stab. output voltage



### NOTE!

The mating connetor and the cable to adjust the settings are not part of the delivery. To order the cable, look up the article no. in the chapter «Accessories».

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### CHARACTERISTICS Oil viscosity v = 30 mm<sup>2</sup>/s





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### PARTS LIST

Position	Article	Description
20	062.0102	Cover
21	223.1317	Dummy plug M16x1,5
22	160.6131	O-ring ID 13,00x1,5
30	072.0021	Gasket 33x2x59,9x2
40	208.0100	Socket head cap screw M4x10
50	246.2160	Socket head cap screw M5x60 DIN 912
55	246.2190	Socket head cap screw M5x90 DIN 912
60	160.2093	O-ring ID 9,25x1,78

Technical explanation see data sheet 1.0-100

### NOTE!

The cable connector is not part of the delivery. The dimensions refer to those of the cable connector in the chapter «Accessories».



### With fieldbus interface



### ACCESSORIES

•	Set-up software	see start-up
•	Cable to adjust the settings through interface L (from plug type A to Mini B, 3 m)	JSB article no. 219.2896
•	Cable connector for analog interface: – straight, soldering contact – 90°, soldering contact Recommended cable size: – Outer diameter 910,5 mm – Single wire max. 1 mm <sup>2</sup> – Recommended wire size: 025 m = 0,75 mm <sup>2</sup> (AWG18)	article no. 219.2330 article no. 219.2331

25...50 m = 1 mm<sup>2</sup> (AWG17)



### Proportional directional control valve

- Integrated amplifier or controller electronics
- Integrated spool position control with LVDT
- Direct operated, not pressure compensated
- Q<sub>max</sub> = 27 l/min
- Q<sub>N max</sub> = 20 l/min
- p<sub>max</sub> = 350 bar

### DESCRIPTION

Direct operated proportional spool valve with integrated electronics in flange design NG6 acc. to ISO 4401-03/7790 with 4 ports. The valve possesses an integrated positional control of the valve spool. This assures a minimal hysteresis and improved dynamic characteristics. 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 Wandfluh proportional solenoids (VDE standard 0580). Low pressure drop due to the body design and spool profiling. The spool is made of hardened steel. The body made of high grade hydraulic casting is painted. The solenoids are zinc coated and the housing for the elctronics is made of aluminium.



#### FUNCTION

With the integrated spool position sensor (LVDT) the actual position of the spool is continuously recorded and made to follow the setpoint value transmitted in an analogue manner. By means of this internal positional control, a minimal hysteresis and excellent dynamic characteristics are assured. With an increasing command value signal, the valve opening and therefore the volume flow changes. With 50 % of the solenoid current, the centre of the spool position (PTAB closed) is reached. In the case of an electric power failure, the spool by means of the spring force shifts into the basic position. Parameter setting and diagnosis with the free-of-charge software «PASO». Data are stored in a non volatile memory. Even after an electric power failure settings can easily be reproduced and transmitted. These valves are available with an integrated controller as an option. As feedback signal source sensors with voltage or current output signal can be directly connected. The available controller structure has been optimised for applications with hydraulic actuators.



#### APPLICATION

Proportional directional control valves with integrated electronics are highly suitable for demanding applications thanks to a high resolution, large volume flow, minimal hysteresis and very good dynamic characteristics. 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 position controls, robotics and fan control.

### TYPE CODE

				A00 -		- 24 - 🗌	#
Directional control	I valve, direct operated						
Proportional valve	e with integrated electronics						
Flange version							
International stan	dard interface ISO, nominal size 6						
Designation of sy	mbols acc. to table 1.10-83/2						
Nominal volume f	flow ranges Q <sub>N</sub> : 10 l/min 10 ACB1-S only	20 l/min 20 A	ACB1-R only	,			
Standard nominal	l voltage U <sub>N</sub> : 24 VDC						
Hardware configu With analog signa With CANopen ac Wtih Profibus DP	uration: al (-10…+10 V voreingestellt) cc. to DSP-408 in accordance with Fluid Power Technology	A2 C1 P1					
Functions: Amplifier Controller with cu Controller with vo	rrent feedback signal (020 mA / 420 mA) Itage feedback signal (010 V)	no remark R1 R2					
Design-Index (Su	bject to change)						-
GENERAL SPEC	CIFICATIONS						
Designation	4/3-way proportional valve with	Amhient tem	nerature -2	0 +65°C (typi	ical)		

Designation	4/3-way proportional valve with integrated electronics	Ambient temperature	-20+65 °C (typical) (The upper temperature limit is a guideline value for typical				
Nominal sizeNG6-Mini acc. to ISO 4401-03/7790ConstructionDirect operated spool valve			applications, in individual cases it may also be higher or lo The electronics of the valve limit the power in case of a too high electronics temperature. More detailed information ca				
Operations	Proportional solenoid, wet pin push type, pressure tight	Mounting position	be obtained from the operating instruct any, preferably horizontal	ions «DSV».)			
Mounting	Flange, 4 fixing holes for socket head cap screws M5x50	Fastening torque Weight	M <sub>D</sub> = 5,5 Nm (quality 8.8) m  = 2,65 kg				
Connections	Threaded connection plates, multi-flange subplates, longitudinal stacking system						
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### TYPE CHARTS/DESIGNATIONS OF SYMBOLS

ACB1 - S S = Symmetrical control mode
ACB1 - R

HYDRAULIC SPECIFICATIONS

РТ

Contamination efficiency Viscosity range Fluid temperature Working pressure Tank pressure Nominal volume flow Max. volume flow Leakage volume flow Hysteresis Repeatability

Jump response

Fluid

ISO 4406:1999, class 18/16/13 (Required filtration grade  $\beta 6...10 \ge 75$ ) refer to data sheet 1.0-50/2 12 mm<sup>2</sup>/s...320 mm<sup>2</sup>/s -20...+70°C p<sub>max</sub> = 350 bar (connections P, A, B)  $p_{max} = 160 \text{ bar} (\text{connections T})$  $Q_{N} = 10 \text{ l/min, 20 l/min,}$ see characteristic on request < 0,4 % < 0,4 % typically 25 ms from 10 to 90 %

R = Meter-out control mode

Mineral oil, other fluid on request

#### **ELECTRICAL SPECIFICATIONS**

Protection class IP 67 acc. to EN 60 529 with suitable connector and closed electronic housing Supply voltage 24 VDC separate adjustment for up and Ramps (amplifier only) down for each solenoid preset value speed adjustable Preset value generator (controller only) Parameterisation via fielbus or USB USB (Mini B) for parameterisation Interface with «PASO» (under the closing screw of the housing cover, factory set parameters) Analog interface Device receptacle (male) M23, 12-poles Mating connector Plug (female), M23, 12-poles (not incl. in delivery) Preset value signal: Voltage/current selected with software Fieldbus interface: Device receptacle

M12, 4-poles Plug (female), M12, 4-poles (not incl in delivery)

M12, 5-poles (acc. to DRP 303-1) Plug (female), M12, 5-poles (not incl. in delivery)

M12, 5-poles, B-codiert (acc. to IEC 947-5-2) Plug (male), M12, 5-poles, B-codet (not incl. in delivery) Fieldbus



supply (male)

Mating connector

Device receptacle

CANopen (male)

Mating connector

Device receptacle

Profibus (female)

Mating connector

Preset value signal:

NOTE!

Detailed electrical characteristics and description of «DSV» electronics are shown on data sheet 1.13-75.

### START-UP

Normally there is no need to adjust settings by the customer. The connectors have to be wired according to the chapter «Connector wiring diagram».

Controllers will be supplied configurated as amplifiers. Switching into controller mode and setting of the adjustments of the controller must be done by the customer using the set-up software (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** protocol with device profile DSP-408 for **«DSV»**.

#### 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 -
  - = Preset value current +
  - = Preset value current -
- 8 = Reserved for extensions
  - = 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.

Factory setting: Voltage (-10...+10 V), (PIN 4/5)

### Fieldbus interface:

3

### Device receptacle supply (male) X1

MAIN



1 = Supply voltage + 2 = Reserved for extensions

### Device receptacle CANopen (male) X3

### CAN

### **Device receptacle Profibus** (female) X3

PROFIBUS



#### 1 = VP 2 = RxD / TxD - N5 3 = DGND4 = RxD / TxD - P

5 = Shield

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

## Feedback signal interface

Device receptacle Sensor (female) X4 (controller only)



2 = Feedback signal + 3 = Supply voltage 0 VDC

1 = Supply voltage (output) +

- 4 = not connected
- 5 = stab. output voltage



### NOTE!

The mating connetor and the cable to adjust the settings are not part of the delivery. To order the cable, look up the article no. in the chapter «Accessories».

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### CHARACTERISTICS Oil viscosity v = 30 mm<sup>2</sup>/s



- = Deadband: 50% of the solenoid current with command signal -2%...+2%
- = Opening point: at command signal ± 4 %
- Flow at  $\Delta p = 10$  bar over 2 metering edges at command signal ±70 %



- = Opening point: at command signal ± 4 % Flow at  $\Delta p = 10$  bar over 2 metering
- edges at command signal ±70 %



### NOTE!

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

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The cable connector is not part of the delivery. The dimensions refer to those of the cable connector in the



With fieldbus interface Controller

NOTE!

chapter «Accessories».



ACCESSORIES

Set-up software

(from plug type A to Mini B, 3 m)

- 90°, soldering contact

Recommended cable size: – Outer diameter 9...10,5 mm – Single wire max. 1 mm<sup>2</sup> – Recommended wire size: 0...25 m = 0,75 mm<sup>2</sup> (AWG18) 25...50 m = 1 mm<sup>2</sup> (AWG17)

Cable connector for analog interface:
 \_ straight, soldering contact

· Cable to adjust the settings through interface USB

### PARTS LIST

Position	Article	Description
20	062.0102	Cover
21	223.1317	Dummy plug M16x1,5
22	160.6131	O-ring ID 13,00x1,5
30	072.0021	Gasket 33x2x59,9x2
40	208.0100	Socket head cap screw M4x10
50	246.2117	Socket head cap screw M5x16 DIN 912
55	246.2190	Socket head cap screw M5x90 DIN 912
60	160.2093	O-ring ID 9,25x1,78

Technical explanation see data sheet 1.0-100

### Wandfluh AG Postfach CH-3714 Frutigen

see start-up

article no. 219.2896

article no. 219.2330

article no. 219.2331



### Proportional directional valve

- not pressure compensated
- Q<sub>max</sub> = 60 l/min
- $Q_N^{\text{max}} = 50 \text{ l/min}$
- p<sub>max</sub> = 315 bar

### DESCRIPTION

CONTENT

TYPE CHARTS/

Mounting

Direct operated proportional spool valve in flange design NG10 acc. to ISO 4401-05 with 4 ports. The spool valve is designed 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 for long service life is painted. The cover and the solenoid are zinc coated.

GENERAL SPECIFICATIONS.....1 HYDRAULIC SPECIFICATIONS ......1 ELECTRICAL SPECIFICATIONS ......1

DESIGNATIONS OF SYMBOLS ......2 CONTROL MODE ......2 CHARACTERISTICS......2 DIMENSIONS......2 PARTS LIST ......2 ACCESSORIES.....2

### FUNCTION

Proportionally to the solenoid current spool stroke, spool opening and valve volume flow will increase. Proportional directional valves NG10 are not load-compensated. The optimum spool shape and progressive characteristics curve allow fine motion control. To control the valve Wandfluh proportional amplifiers are available (see register 1.13).

**NG10** 

ISO 4401-05



### APPLICATION

Proportional directional spool valves are well suited for demanding applications where high resolution, high volume flow and low hysteresis are requested. They are implemented in industrial hydraulics as well as in mobile hydraulics for the smooth control of hydraulic actuators.

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**

	A	PW 🗋 4	1	- 50	-	#	
International mounting interface ISO							
Proportional directional valve							
Control mode acc. to table 1.10-90/2							
Number of control ports							
Description of symbols acc. to table 1.	10-90/2						
Nominal flow at 10 bar pressure drop over 2 metering edges = 50 l/min							
Standard nominal voltage $\mathrm{U}_{\mathrm{N}}\!\!:$	12 VDC 24 VDC	G12 G24					
Design-Index (Subject to change)							

**GENERAL SPECIFICATIONS** 

Nominal size NG10 acc. to ISO 4401-05 Designation 4/2-, 4/3-way proportional-control valve Construction Direct operated spool valve Flange, 4 fixing holes for socket head cap screws M6x65 Fastening torque  $M_{p} = 9,5 \text{ Nm}$  (screw quality 8.8) Pipe connection Connection plates, Multi-station flange subplate, Longitudinal stacking system Mounting position any, preferably horizontal Ambient temperature -20...+50°C Weight: 4/2-way m = 4,3 kg

m = 5,7 kg

### HYDRAULIC SPECIFICATIONS

Mineral oil, other fluid on request
ISO 4406:1999, class 18/16/13
(Required filtration grade ß 6…10≥75)
refer to data sheet 1.0-50/2
12 mm²/s…320 mm²/s
-20+70 °C
p <sub>max</sub> = 315 bar (connections P, A, B)
$p_{max} = 160$ bar (connection T)
$Q_{N} = 50 \text{ l/min} (Q_{max} = 60 \text{ l/min})$
at 10 bar pressure drop over 2 metering edges.
on request
$\leq 5\% *$
<ul> <li>at optimal dither signal</li> </ul>

### **ELECTRICAL SPECIFICATIONS**

4/3-way

Construction	Proportional solenoid, wet pin push type,				
	pressure tight.				
Standard-Nominal voltage	U = 12 VDC	U = 24 VDC			
Limiting current	I <sub>G</sub> = 2300 mA	I <sub>G</sub> = 1150 mA			
Relative duty factor	100% DF (see data sheet 1.1-430)				
Protection class	IP 65 acc. to EN 60529				
Connection / Power supply	y Over device plug connection				
	to ISO 4400/DIN 43650 (2P+E)				
Other electrical specifications see data sheet 1 1-155 (PI60V)					

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### TYPE CHARTS / DESIGNATIONS OF SYMBOLS



CHARACTERISTICS oil viscosity v = 30 mm<sup>2</sup>/s  $\Delta p = f(Q)$  Pressure loss/flow-characteristics over 2 metering edges



 $Q_{I} = f(p)$  Volume flow-pressure-characteristics







Proportional-amplifier

Technical explanation see data sheet 1.0-100

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4/2-way valve



### PARTS LIST

Position	Article	Description
10	256.5454 256.5418	Proportional solenoid PI60V-G24-M40 Proportional solenoid PI60V-G12-M40
20	253.8002	Plug with integrated manual override HB8,5
30	219.2001	Plug A (grey)
35	219.2002	Plug B (black)
40	059.2205	Cover
50	246.3190	Socket head cap screw M6x90 DIN 912
60	246.3121	Socket head cap screw M6x20 DIN 912
70	160.2140	O-ring ID 14,00 x 1,78

Illustrations not obligatory Data subject to change



### Proportional spool valves

### Proportional directional valve · pilot operated

- · not pressure compensated
- Q<sub>max</sub> = 220 l/min
- Q<sub>N</sub><sup>max</sup> = 80 l/min p<sub>max</sub> = 315 bar

### DESCRIPTION

CONTENT

Pilot controlled spool valve, in five chamber design actuated by a Wandfluh proportional solenoid (VDE standard 0580). Wet solenoid in oil. Spool with precisely machined notches on control edges produce a progressive volume flow characteristic similar to proportional flow valves. The valve body, the covers and the solenoids are zinc coated.

### FUNCTION

Depending on selected spool, the valve controls flow symmetrically or in meter-in or in meter-out mode. The spool is piloted by a proportional pressure relief valve. Set-up, function and interaction of main and pilot stage are shown with the hydraulic diagram. To control the valve Wandfluh proportional amplifiers are available (see register 1.13).

NG10

ISO 4401-05



### APPLICATION

High flow capacity and stiffness of the pilot system make this valve on ideal device for fast acceleration and deceleration, high speed, and sensitive adjustment of motion of an actuator. Application: Tooling machines, lifting and haulage systems, textile and plactic industry, mobile applications.

CONTENT	
GENERAL SPECIFICATIONS	1
HYDRAULIC SPECIFICATIONS	1
ELECTRICAL SPECIFICATIONS	2
TYPE CHARTS/ DESIGNATIONS OF SYMBOLS	2
CONTROL MODE	2
CHARACTERISTICS	2
DIMENSIONS	3
HYDRAULIC DIAGRAM	3
PARTS LIST	3
ACCESSORIES	3

### TYPE CODE

A	VPW 4 - 80 #
International mounting interface ISO	
Pilot operated proportional spool valve	
Control mode: Symmetrical S Meter-in V Meter-out R (see control mode on page 2)	
Number of control ports	
Description of symbols acc. to table 1.10-95/2	
Nominal flow at 10 bar pressure drop over 2 m $Q_N = 80 \text{ l/min}$	ietering edges
Pilot pressure supply and drain: Pressure supply (x) and drain (y) internal Pressure supply (x) and drain (y) external Pressure supply (x) internal drain (y) external Pressure supply (x) external drain (y) internal	ti te pi pe
Standard nominal voltage U <sub>N</sub> : 12 VDC 24 VDC	G12 G24
Design-Index (Subject to change)	

### **GENERAL SPECIFICATIONS**

Nominal size Designation Construction Mounting

Fastening torque Pipe connection

Mounting position Ambient temperature Weight: 4/2-way 4/3-way

NG10 acc. to ISO 4401-05 4/2-, 4/3-way proportional-control valve Pilot operated spool valve Flange, 4 fixing holes for socket head cap screws M6x65  $M_p = 9.5 \text{ Nm}$  (screw quality 8.8) Connection plates, Multi-station flange subplate, Longitudinal stacking system any, preferably horizontal -20...+50°C m = 4,9 kg m = 5,3 kg

### HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination	ISO 4406:1999, class 18/16/13
efficiency	(Required filtration grade ß 6…10≥75)
	refer to data sheet 1.0-50/2
Viscosity range	12 mm <sup>2</sup> /s320 mm <sup>2</sup> /s
Fluid temperature	-20+70 °C
Working pressure	p <sub>max</sub> = 315 bar (connection P, A, B)
Tank pressure in T	$p_{max} = 160$ bar (te,pi) $p_{max} = 5$ bar (ti,pe)
Nominal volume flow	$Q_{N} = 80 \text{ l/min} (Q_{max} = 220 \text{ l/min})$
	at 10 bar pressure drop over 2 metering edges
Pilot pressure	p <sub>v</sub> = 25315 bar
Leakage volume flow	on request
Hysteresis	≤ 5 % *
-	* by optimal dithersignal



#### **ELECTRICAL SPECIFICATIONS**

Construction	Proportional solenoid, wet pin push type, pressure tight.				
Standard-Nominal voltage	U = 12 VDC	U = 24 VDC			
Limiting current	I <sub>G</sub> = 1250 mA	l <sub>G</sub> = 680 mA			
Relative duty factor	100 % DF (see data sheet 1.1-430)				
Protection class	IP 65 acc. to EN 60529				
Connection / Power supply	Over device plug connection to				
	ISO 4400/DIN 436	50 (2P+E)			

Other electrical specifications see data sheet 1.1-116 (PI35V-M40)

### **TYPE CHARTS / DESIGNATIONS OF SYMBOLS**

$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	s v .D101 R
a P T	s v .Z101a R
$a \bigvee \bigvee_{\frac{T}{P}} \frac{A}{T} \bigvee_{\frac{T}{P}} b$	s v .Z101b
	v .D102
	v .Z102a
	v .Z102b

### CONTROL MODE





### **CHARACTERISTICS** oil viscosity $\upsilon$ = 30 mm<sup>2</sup>/s

 $\Delta p = f(Q)$  Pressure loss/flow-characteristic over 2 metering edges



Q = f (I) Volume flow-signal-characteristics







4/2-way valve





### Mounting instruction

To screw the main valve body ( $M_p = 9,5$  Nm, quality 8.8) to the base plate the pilot valve ( $M_p = 5,5$  Nm, quality 8.8). must be taken off.

### HYDRAULIC DIAGRAM



4/2-way valve



### PARTS LIST

Position	Article	Description
10	246.2156	Cyl. screw M5x55 DIN 912
20	160.2093	O-ring ID 9,25x1,78
30	160.2052	O-ring ID 5,28x1,78
40	160.2140	O-ring ID 14,00x1,78

### ACCESSORIES

Sub-plates Proportional-amplifier Register 2.9 Register 1.13

#### Technical explanation see data sheet 1.0-100

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# Proportional directional valve cartridge construction

- · pilot operated
- not pressure compensated
- Q<sub>max</sub> = 150 l/min
- $p_{max} = 350 \text{ bar}$
- $Q_N^{\text{max}}$  = 90 l/min

### DESCRIPTION

Pilot operated proportional directional valve with screw-in cartridge, thread M33x2, for cavity according to Wandfluh standard. The piston and sleeve are made of hardened steel, external parts are zinc coated and therefore well protected against corrosion.

# M33x2

Wandfluh standard

The valve is controlled externally through a

pilot pressure via the x and y connections.

Without control, the piston is held in the central

positon by a spring. The piston opening and

volume flow increase proportionally to the

pilot pressure. Thanks to the optimum piston shape, sensitive movement processes are pos-

sible. Wandfluh proportional pressure valves (see register 2.3) and Wandfluh proportional amplifiers (see register 1.13) are available for

FUNCTION

control purposes.



### APPLICATION

Proportional directional spool valves are well suited for demanding applications where high resolution, high volume flow and low hysteresis are requested. They are implemented in industrial hydraulics as well as in mobile hydraulics for the smooth control of hydraulic actuators.

### TYPE CODE

	W	V	Ρ	PM33	-	-	-	90	#
Directional valve									
Pilot operated									
Proportional									
Screw-in cartridge M33x2									
Designation of symbols according to type charts 1.10-2310/2									
Nominal volume flow level Q <sub>N</sub> 90 I/min									
Design-Index (subject to change)									

### TYPE CHARTS / DESIGNATIONS OF SYMBOLS

ACB - S S = Symmetrical control mode		ADB - V V = Meter-in control mode
CB2 - S S = Symmetrical control mode		DB2 - V V = Meter-in control mode

### GENERAL SPECIFICATIONS

Designation	
Construction	

Actuation Mounting Ambient temperature Mounting position Fastening torque Weight Cavity Pilot operated proportional directional valve Screw-in cartridge for cavity according to Wandfluh standard Pilot valve thread M33x2 -30...90 °C any, preferably horizontal  $M_p = 70...80$  Nm m = 0,79 kg Detailed cavity drawing see data sheet 2.13-1053

### HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406: 1999, class 18/16/13
-	(Required filtration grade $\& 610 \ge 75$ )
	refer to data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20+70 °C
Maximum pressure	p <sub>max</sub> = 350 bar
Minimum pilot pressure	$p_{V_{min}} = 4,5 \text{ bar}$
Maximum pilot pressure	p <sub>vmax</sub> = 30 bar
Nominal volume flow level	Q <sub>N</sub> = 90 l/min
Volume flow range	Q = 0150 l/min
Leakage volume flow	P → T (at 200 bar): < 0,4 l/min
-	

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### **CHARACTERISTICS** oil viscosity $\upsilon$ = 30 mm<sup>2</sup>/s





### DIMENSIONS



### ACCESSORIES CONNECTION EXAMPLE Register 2.3 Proportional pressure valves Proportional amplifier Register 1.13 В A $\mathbb{N}$ Technical explanation see data sheet 1.0-100 P Т MDPPM16 MDPPM16 111 W Ш

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Data sheet no. 1.10-2310E 2/2 Edition 14 09



### **Proportional directional valve** cartridge construction

- pilot operated
- not pressure compensated

• Q<sub>N</sub> = 150 l/min

### DESCRIPTION

Pilot operated proportional directional valve with screw-in cartridge, thread M42 x 2, for cavity according to Wandfluh standard. The piston and sleeve are made of hardened steel, external parts are zinc coated and therefore well protected against corrosion.

### M42 x 2 Wandfluh standard

### **FUNCTION**

The valve is controlled externally through a pilot pressure via the x and y connections. Without control, the piston is held in the central positon by a spring. The piston opening and volume flow increase proportionally to the pilot pressure. Thanks to the optimum piston shape, sensitive movement processes are possible. Wandfluh proportional pressure valves (see register 2.3) and Wandfluh proportional amplifiers (see register 1.13) are available for control purposes.



### APPLICATION

Proportional directional spool valves are well suited for demanding applications where high resolution, high volume flow and low hysteresis are requested. They are implemented in industrial hydraulics as well as in mobile hydraulics for the smooth control of hydraulic actuators.

### **TYPE CODE**



#### **GENERAL SPECIFICATIONS** Designation

Construction Actuation Mounting Ambient temperature Mounting position Fastening torque Weight Cavity

Pilot operated proportional directional valve Screw-in cartridge for cavity according to Wandfluh standard Pilot valve thread M42x2 -30...90°C any, preferably horizontal M<sub>D</sub> = 80...100 Nm m<sup>-</sup> = 1,4 kg Detailed cavity drawing see data sheet 2.13-1052

### HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13
	(Required filtration grade ß 610≥75)
	refer to data sheet 1.0-50/2
Viscosity range	12 mm²/s320 mm²/s
Fluid temperature	-20+70 °C
Maximum pressure	p <sub>max</sub> = 315 bar
Minimum pilot pressure	$p_{V_{min}} = 4,5 \text{ bar}$
Maximum pilot pressure	$p_{v_{max}} = 30 \text{ bar}$
Nominal volume flow level	$Q_{N} = 150 \text{ l/min}$
Volume flow range	Q = 0250 l/min
Leakage volume flow	P → T (at 200 bar): < 0,5 l/min



### TYPE CHARTS / DESIGNATIONS OF SYMBOLS



### **CHARACTERISTICS** oil viscosity $v = 30 \text{ mm}^2/\text{s}$

 $Q = f(\Delta p)$  Pressure loss/flow-characteristics over 1 metering edges Q [l/min]







### DIMENSIONS



У

#### ACCESSORIES CONNECTION EXAMPLE Register 2.3 Proportional pressure valves Proportional amplifier Register 1.13 В А $\Lambda \Lambda$ Technical explanation see data sheet 1.0-100 х Ρ MDPPM16 MDPPM16 ъ *\*\\ ١٨٨

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- Proportional directional control valve • Integrated amplifier
- or controller electronics
- · Direct operated, not pressure compensated
- $Q_{max} = 20 \text{ l/min}$
- $Q_N = 12 \text{ l/min}$
- $p_{max} = 350 \text{ bar}$

### DESCRIPTION

Direct operated proportional spool valve with integrated electronics in flange design NG4-Mini Interface to Wandfluh standard 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 elctronics is made of aluminium.



NG4-Mini

### 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

fi eldbus 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

	WDPF	A04 -	- 🗆 - 🗆		/ M	E		#
Spool valve								
Direct operated								
Proportional								
Flange construction								
Mounting interface acc. to Wand	fluh standard, NG4-Mini							
Description of symbols acc. to ta	ble 1.10-3240/2							
Nominal volume flow $Q_{\rm N}$	4 l/min 4 8 l/min 8 12 l/min 12							
Standard nominal voltage $U_{N}$	12VDC G 24VDC G2	12 24						
Slip-on coil	Metal housing, square							
Electric connection	Integrated electronics							
Hardware configuration: With analog signal (-10+10 V f With CANopen acc. to DSP-408 With Profibus DP in accordance With CAN J1939 (on request)	actory set) Fluid Power Technology	A2 C1 P1 J1						
Functions: Amplifier Controller with current feedback Controller with voltage feedback	no remark signal (020 mA / 420 mA) signal (010 V)	R1 R2						
Sealing material	NBR FKM (Viton)	 D1						
Manual override	Integrated Push-button Spindle	HF1 HS1						
Design-Index (Subject to change	e)							_

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#### **GENERAL SPECIFICATIONS**

Nominal size	NG4-Mini to Wandfluh standard
Designation	4/3-way proportional valve with
	integrated electronics
Construction	Direct operated spool valve
Operations	Proportional solenoid
Mounting	Flange, 3 fixing holes for
	socket head cap screws M5x40
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 <sub>D</sub> = 5,5 Nm (Qualität 8.8)
	for fixing screws
	M <sub>D</sub> = 7 Nm for knurled nut
Weight:	m = 1,8 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

Feedback signal interface (Sensor): (controller only) . . . . . . . . . Device re

Device receptacle (female)	M12, 5-poles
Mating connector	Plug (male), M12, 5-poles
	(not incl. in delivery)
Feedback signal::	Voltage/current state when ordering

Fieldbus

### HYDRAULIC SPECIFICATIONS

Fluid	N
Contamination efficiency	15
	(F
	re
Viscosity range	1
Fluid temperature	-2
Working pressure	р
Tank pressure	р
Nominal volume flow	G
Max. volume flow	S
Leakage volume flow	0
Hysteresis	$\leq$

lineral oil, other fluid on request SO 4406:1999, class 18/16/13 Required filtration grade  $\beta$  6...10  $\geq$  75) efer to data sheet 1.0-50/2 2 mm<sup>2</sup>/s...320 mm<sup>2</sup>/s 20...+70°C max = 350 bar (connections P, A, B)  $m_{max}$  = 160 bar (connections T)  $R_{N}$  = 5 l/min, 10 l/min, 16 l/min, 32 l/min ee characteristic on request 6%

### CONNECTOR WIRING DIAGRAM

### Analog interface:

#### Device receptacle (male) X1



- = 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



3

5

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### 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



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

### Feedback signal interface (Sensor)

Device receptacle (female) X4 (only controller)



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



### TYPE CHARTS/DESIGNATIONS OF SYMBOLS

$\begin{array}{c c} A & B \\ \hline \\$	ACB - S S = Symmetrical control mode
	AC1 - S S = Symmetrical control mode
$ \begin{array}{c} A \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	CB2 - S S = Symmetrical control mode

$\begin{array}{c c} A & B \\ \hline \\ \hline \\ \hline \\ P & T \end{array}$	ACB - R R = Meter-out control mode
	AC1 - R R = Meter-out control mode
$ \begin{array}{c c} A & B \\ & & \\ & & \\ & & \\ & & \\ & & \\ P & T \end{array} $	CB2 - R R = Meter-out control mode





### NOTE!

Detailed electrical characteristics and description of  ${\rm \ll}DSV{\rm \gg}$  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».









Flow at  $\Delta p = 10$  bar over 2 metering edges at command signal ±70%

### Legend:

- **1:**  $Q_N = 4 l/min$
- 2: Q<sub>N</sub> = 8 l/min
- 3: Q<sub>N</sub> = 12 l/min

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With analog interface Amplifier and controller



With Fieldbus interface Controller



### With Fieldbus interface

Amplifier









### PARTS LIST

Position	Article	Description
20	062.0102	Cover
21	223.1317	Dummy plug M16 x1,5
22	160.6131	O-ring ID 13,00x1,5
30	072.0021	Gasket 33,2x59,9x2
40	208.0100	Socket head cap screw M4x10
50	160.2052 160.6052	O-ring ID 5,28x1,78 (NBR) O-ring ID 5,28x1,78 (FKM)
60	160.2187 160.6187	O-ring ID 18,72x2,62 (NBR) O-ring ID 18,72x2,62 (FKM)
70	154.2700	Knurled nut
80	253.7001	Push-button HF1
90	253.7000	Spindle HS1

#### 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 mm<sup>2</sup>
- Recommended wire size:  $0...25 \text{ m} = 0.75 \text{ mm}^2 (\text{AWG18})$ 25...50 m = 1 mm<sup>2</sup> (AWG17)

Technical explanation see data sheet 1.0-100

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- Proportional directional control valve • Integrated amplifier
- or controller electronics
- Direct operated, not pressure compensated
- $Q_{max} = 40$  l/min
- $Q_N = 32 \text{ l/min}$
- $p_{max} = 350 \text{ bar}$

### 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	И Е 🗌 🗌	]- 📖 📖	#
Spool valve							
Direct operated							
Proportional							
Flange construction							
International standard interface I	SO, nominal size 6						
Description of symbols acc. to ta	ble 1.10-3340/2						
Nominal volume flow $Q_N$	5 I/min         5           10 I/min         10           16 I/min         16           32 I/min         32						
Standard nominal voltage $\mathrm{U}_{\mathrm{N}}$	12 VDC 24 VDC	G12 G24					
Slip-on coil	Metal housing, squ	Jare					
Electric connection	Integrated electron	lics					
Hardware configuration: With analog signal (-10+10 V fa With CANopen acc. to DSP-408 With Profibus DP in accordance With CAN J1939 (on request)	actory set) Fluid Power Technolog	ЭЛ	A2 C1 P1 J1				
Functions: Amplifier Controller with current feedback Controller with voltage feedback	no remark signal (020 mA / 4; signal (010 V)	20 mA)	R1 R2				
Sealing material	NBR FKM (Viton)		D1				
Manual override	Integrated Push-button Spindle		HF1 HS1				
Design-Index (Subject to change	)						



### TYPE CHARTS/DESIGNATIONS OF SYMBOLS

A B		A B	
N N I I A K	W ACB - S		ADB - V
	S = Symmetrical control mode		V = Meter-in control mode
		L ř I	
GENERAL SPECIFICA	TIONS	HYDRAULIC SPECIFICA	TIONS
Nominal size	NG6-Mini acc. to ISO 4401-03/7790	Fluid	Mineral oil, other fluid on request
Designation	4/3-way proportional valve with integrated electronics	Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade β 6…10≥75)
Construction	Direct operated spool valve		refer to data sheet 1.0-50/2
Operations	Proportional solenoid	Viscosity range	12 mm <sup>2</sup> /s320 mm <sup>2</sup> /s
Mounting	Flange, 4 fixing holes for	Fluid temperature	-20+70°C
	socket head cap screws M5x50	Working pressure	p <sub>max</sub> = 350 bar (connections P, A, B)
Connections	Multi-station flange subplate	Tank pressure	$p_{max} = 160 \text{ bar} (\text{connections T})$
	Longitudinal stacking system	Nominal volume flow	Q <sub>N</sub> = 5 l/min, 10 l/min, 16 l/min, 32 l/min
Ambient temperature	-20…+65 °C (typical)	Max. volume flow	see characteristic
	(The upper temperature limit is a guideline value for typical applications, in individual cases it may also be	Leakage volume flow	on request
	higher or lower. The electronics of the valve limit the	Hysteresis	≤ 6 %
	power in case of a too high electronics temperature.		
	operating instructions «DSV».)	CONNECTOR WIRING D	IAGRAM
Mounting position	any, preferably horizontal	Analog interface:	
r asterning torque	for fixing screws	Device receptacle (male	) X1
	M <sub>2</sub> = 7 Nm for knurled nut		
Weight:	m = 2.8 kg		= Supply voltage +
5		091 2	<ul> <li>Supply voltage 0 vDC</li> <li>Stabilised output voltage</li> </ul>
			= Preset value voltage +
ELECTRICAL SPECIFI	CATIONS	\\ 6 11 3 // 5	= Preset value voltage -
Protection class	IP 67 acc. to EN 60 529	5 4 6	= Preset value current +
	with suitable connector and closed	7	= Preset value current -
o	electronics housing	8	<ul> <li>Reserved for extensions</li> </ul>
Supply voltage	12 VDC or 24 VDC	9	<ul> <li>Reserved for extensions</li> </ul>
Ramps	adjustable	10	0 = Enable control (Digital input)
Parameterisation	VIA Fleidbus of USB	11	1 = Error signal (Digital output)
Interface	USB (Mini B) for parameterisation	12	2= Chassis
	WITH «PASO» (under the closing screw of the housing cover		$4/\Gamma$ ) reconnected with
	Preset ex-works	Preset value voltage (PIN	4/5) resp. current (PIN 6/7) are selected with
Analog interface:		Eactory setting: Voltage (-	$10 + 10 \sqrt{10}$ (PIN 4/5)
Device receptacle (male	e) M23, 12-poles	ruotory setting. voltage (	
Mating connector	(not incl. in delivery)	CANopen interface:	
Preset value signal	Input voltage / current as well as signal	Dovice recentede cumpl	v (mala) V1
Ū	range can be set by software.		y (male) XI
Fieldbus interface:			Itage +
Device receptacle		(2,) 2 = Reserved	for extensions
supply (male)	M12, 4-poles	$3 \cdot 4$ $3 = Supply yo$	Itage 0 VDC
Mating connector	Plug (female), M12, 4-poles	4 = Chassis	lage of vible
-	(not incl. in delivery)		
Device receptacle		Device receptacle	Device receptacle
CANopen (male)	M12, 5-poles (acc. to DRP 303-1)	CANopen (male) X3	Profibus (female) X3
Mating connector	Plug (female), M12, 5-poles	CAN	PROFIBUS
Device receptacle		1 = not conne	cted 1 = VP
Profibus (female)	M12, 5-poles, B-coded (acc. to IEC 947-5-2)	$\left( \left( \begin{array}{c} 2 \\ -5 \end{array} \right) \right) = 0$ 2 = not conne	cted $\int \frac{2}{5} \cdot \frac{3}{5} = \frac{3}{2} = \frac{1}{2} - \frac{1}{2}$
Mating connector	Plug (male), M12, 5-poles, B-coded	$3^3 \cdot 4 = CAN Gnd$	$\begin{bmatrix} 1 & 4 \end{bmatrix} = 3 = DGND$
	(not incl. in delivery)	4 = CAN High	4 = RxD/TxD - P
Preset value signal	Fieldbus	5 = CAN Low	5 = Shield
Feedback signal interfac	ce (Sensor):	Parameterisation interfa	ce (USB, Mini B) X2
(controller only)		Under the closing screw of	of the housing cover
Device receptacle (fema	ale)M12, 5-poles		
Mating connector	Plug (male), M12, 5-poles	Feedback signal interfac	ce (Sensor)
	(not incl. in delivery)	Device receptacle (fema	le) X4 (only controller)
reedback signal::	VOITAGE / CURRENT state when ordering		-, - (,
		1 = Supply vo	ltage (output) +
		$\begin{pmatrix} \epsilon \cdot \cdot \cdot \\ 5 \end{pmatrix}$ 2 = Feedback	signal +
		3 = Supply vo	
		4 = not conne	
		5 = Stab. Outpl	ui voilaye

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#### 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»** 

### CHARACTERISTICS oil viscosity v = 30 mm<sup>2</sup>/s



4: Q<sub>N</sub> = 32 l/min

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**».



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



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With analog interface Amplifier and controller



### With Fieldbus interface Controller



PARTS LIST

### With Fieldbus interface

Amplifier



### MANUAL OVERRIDE

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

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- 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 mm<sup>2</sup>
- Recommended wire size:
- $0...25 \,\mathrm{m} = 0.75 \,\mathrm{mm^2} \,\mathrm{(AWG18)}$
- 25...50 m = 1 mm<sup>2</sup> (AWG17)

Technical explanation see data sheet 1.0-100

Position	Article	Description
20	062.0102	Cover
21	223.1317	Dummy plug M16x1,5
22	160.6131	O-ring ID 13,00x1,5
30	072.0021	Gasket 33,2x59,9x2
40	208.0100	Socket head cap screw M4x10
50	160.2093	O-ring ID 9,25x1,78 (NBR)
	160.6092	O-ring ID 9,25x1,78 (FKM)
60	160.2222	O-ring ID 22,22x2,62 (NBR)
	160.6222	O-ring ID 22,22x2,62 (FKM)
70	154.2701	Knurled nut
80	253.7004	Push-button
90	253.7002	Spindle

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