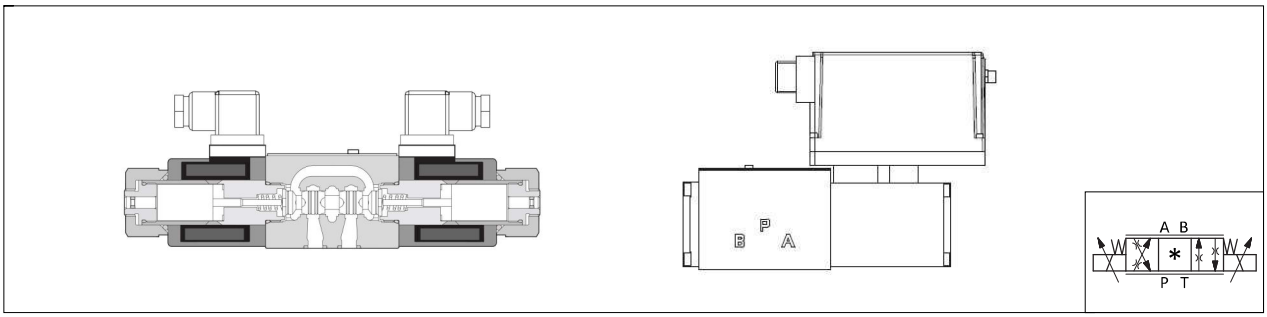
PDVA-N proportional directional valve

Directly-operated, sub-plate mounting, open-loop, max pressure 350bar, max flow 100L/min

1. Introduction

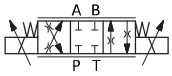
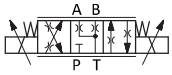
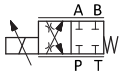
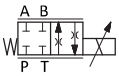
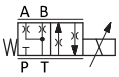


PDVA-N is directly-operated sub-plate mounting open-loop control proportional directional valve. When input a command signal into the electronic amplifier (OBE on-board electronics, or non-OBE, or DIN plug-in driver), the amplifier will generate a corresponding electrical driving current which eventually transforms into a mechanical driving force and this force moves the valve spool over a certain distance in a certain direction corresponding to the signal and keeps the spool opening stable. A change of the command signal will cause a corresponding change of the spool opening and consequently the flow through the valve.

2. How to order

PDVA	-	N	N	-	06	E0	-	L	50	-	NS	-	M	25	N	-	21
(1)		(2)	(3)		(4)	(5)		(6)	(7)		(8)		(9)	(10)	(11)		(12)

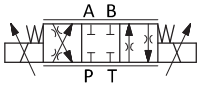
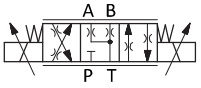
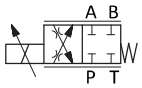
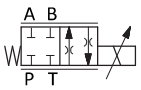
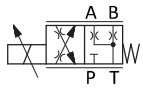
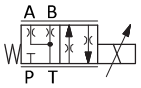
(see below the details)

(1)	**Product Category**			
	PDVA	PDVA direct-operated subplate mounting proportional directional valve		
(2)	**Spool LVDT**			
	N	spool without LVDT (open-loop)		
(3)	**Electronic Amplifier (see setion 8)**			
	N	without amplifier (amplifier to be ordered separately)		
	B	with on-board electronic (OBE) amplifier		
(4)	**Valve Size**			
	06	NG6		
	10	NG10		
(5)	**Valve Configuration (see section 3)**			
	E0		**J0**	
	E1		**E2**	
	J1		**J2**	
(6)*	**Spool Type (see section 7)**			
	L		linear	
	S		progressive	
	SD		differential progressive. $Q_{P-A} = 2Q_{B-T}$; $Q_{A-T} = 2Q_{P-B}$ (for E0 & J0 only)	

* For other diagrams, please consult BMEG.

(7)	**Nominal Flow Rate**			
	8	8 L/min	(for NG6)	Note: values listed are the flow rates at full ΔP=30bar and viscosity 40cSt of ISO VG46.
	30	30 L/min		
	50	50 L/min		
	80	80 L/min	(for NG10)	
	100	100 L/min		
(8)	**Command Signal**			
	NS	without amplifier	(for PDVA-NN)	
	UA	0 - ±10V	(for PDVA-NB)	
	UB	0 - +10V	(for PDVA-NB)	
	IA	4 - 20mA	(for PDVA-NB)	
(9)	**Fluid**			
	M	mineral-based oil	**O**	other fluids (consult BMEG)
	V	water glycol		
	P	phosphate ester		
	A	aero red oil		
(10)	**Nominal Driving Current of Coil**			
	25	2.5A (standard)	**10**	1.0A
	30	3.0A		
(11)	**Special Option (see section 8.2 & 8.3)**			
	N	no special function		
	K	coil with Deutsch DT-04-2P interface (for PDVA-NN)		
	J	coil with AMP Junior Timer interface (for PDVA-NN)		
	S	coil with Lead Wire interface (for PDVA-NN)		
	Q	enable signal (+24Vdc) (for PDVA-NB)		
	F	failure alarm (for PDVA-NB)		
	O	other requirements (consult BMEG)		
(12)	**Series No.**			
	20	design series No. (for PDVA-NB)		
	21	design series No. (for PDVA-NN)		

3. Valve configuration

Code	Schematic	Electronic amplifier	Code	Schematic	Electronic amplifier
PDVA-N*-E0**		**NN**: without amplifier[a] **NB**: with OBE amplifier EP32	**PDVA-N*-**J0**		**NN**: without amplifier[a] **NB**: with OBE amplifier EP32
PDVA-N*-E1**		**NN**: without amplifier[b] **NB**: with OBE amplifier EP31	**PDVA-N*-**E2**		**NN**: without amplifier[b] **NB**: with OBE amplifier EP31
PDVA-N*-J1**		**NN**: without amplifier[b] **NB**: with OBE amplifier EP31	**PDVA-N*-**J2**		**NN**: without amplifier[b] **NB**: with OBE amplifier EP31

a) BMEG DIN-rail amplifier "EP62" or "EP22" to be ordered separately ;
b) BMEG DIN-rail amplifier "EP61" or "EP21" or plug-in amplifier "EP11" to be ordered separately.

4. Main hydraulic & electric data[1)]

Code	Max flow[2)] (L/min)	Max pressure (bar)	Response time[3)] (ms)	Repeatibility	Hysteresis	Coil resistance @20°C & Max current
PDVA-N*-06-*8**	8	P: 350 A: 350 B: 350 T: 210	<= 30	± 1%*SI_{max}[4)]	< 4%*SI_{max}[4)]	3.2Ω, 2.7A (for **25** coil) 2.2Ω, 3.2A (for **30** coil) 13Ω, 1.2A (for **10** coil)
PDVA-N*-06-*30**	30					
PDVA-N*-06-*50**	50					
PDVA-N*-10-*80**	80		<= 40			
PDVA-N*-10-*100**	100					

1) Data shown in this table based on BMEG amplifer (OBE) under condition of ISO VG46 mineral oil at 40cSt;
2) Flow rate at full ΔP=30bar, details refer to section 7;
3) Step signal from 0 to 100%, details refer to section 7.2;
4) SI_{max} referred to as max input signal.

5. Main technical characteristics

Mounting	Mounting type	sub-plate mounting
	Mounting position	any
	Mounting interface	PDVA-N*-06: NG6, ISO: 4401-03-02-0-05 / CETOP 03
		PDVA-N*-10: NG10, ISO: 4401-05-04-0-05 / CETOP 05
	Mounting surface	surface flatness: 0.01/100(ISO 1101); surface roughness: Ra 0.4
Temperature	Ambient temp.	-20 °C - +60 °C
	Fluid temp.	-20 °C - +80 °C (in relation to the seals)
Fluid	Fluid applicable	DIN 51524...535 oil, etc. (see ordering code)
	Viscocity recommended	10 - 100 cSt @ 40 °C; Max range: 2.8 - 400 cSt
	Filtration finess	ISO 4406 20/18/15, NAS1638 class 9; 10μm & β_{10} >= 75 suggested

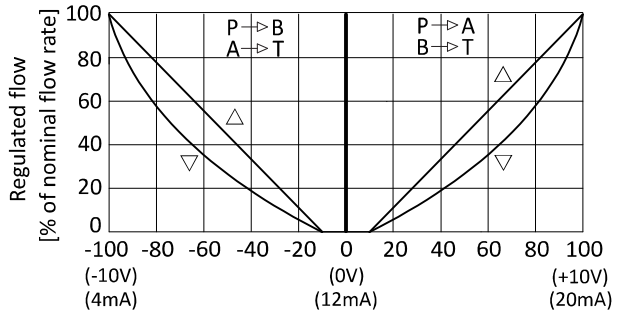
6. Command signal vs. valve operating position

Code	Command signal vs. valve operating position			Description
	Left position	Center position	RIght position	
PDVA-N*-E0** **PDVA-N*-**J0**	 (-10 - 0V or 4 - 12mA)	**E0**   **J0** (0V or 12mA)	 (0 - +10V or 12 - 20mA)	UA: ±10V IA: 4 - 20mA
PDVA-N*-E1** **PDVA-N*-**J1**	 (0 - +10V or 4 - 20mA)	**E1**   **J1** (0V or 4mA)	No right position	UB: 0 - 10V IA: 4 - 20mA
PDVA-N*-E2** **PDVA-N*-**J2**	No left position	**E2**   **J2** (0V or 4mA)	 (0 - +10V or 4 - 20mA)	

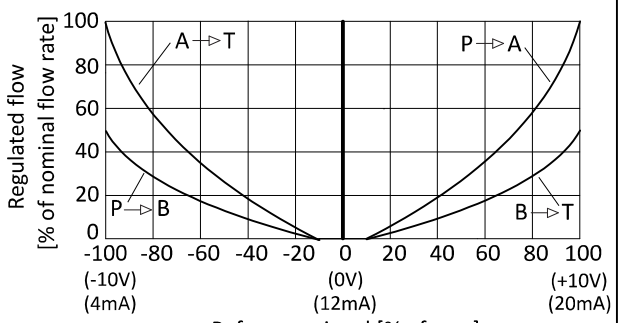
7. Performance diagrams (ISO VG46 oil @40cSt)

7.1. Flow regulating diagram

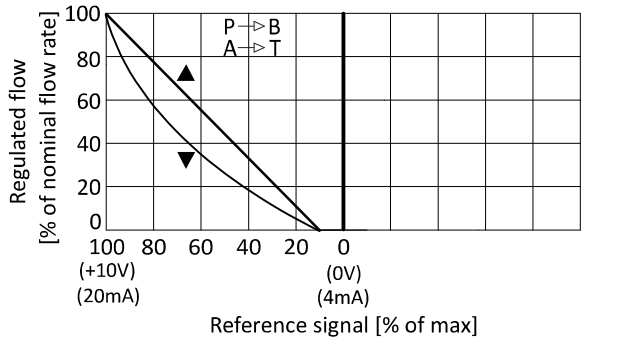
△ = PDVA-N*-**E0-L*** & PDVA-N*-**J0-L***
▽ = PDVA-N*-**E0-S*** & PDVA-N*-**J0-S***



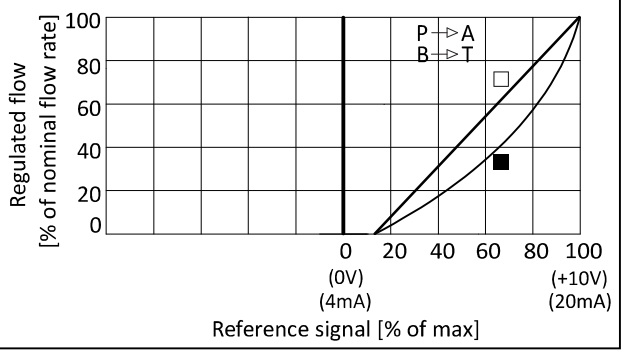
PDVA-N*-**E0-SD***
PDVA-N*-**J0-SD***



▲ =PDVA-N*-**E1-L** & PDVA-N*-**J1-L**
▼ =PDVA-N*-**E1-S** & PDVA-N*-**J1-S**

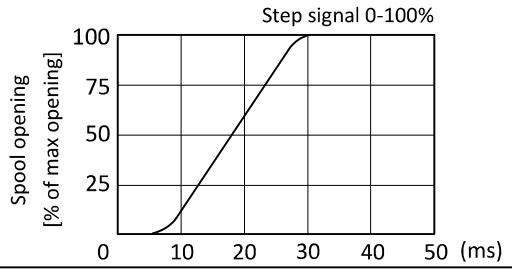


□ =PDVA-N*-**E2-L** & PDVA-N*-**J2-L**
■ =PDVA-N*-**E2-S** & PDVA-N*-**J2-S**

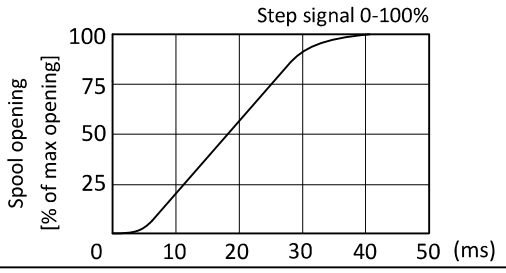


7.2. Response time

PDVA-N*-06

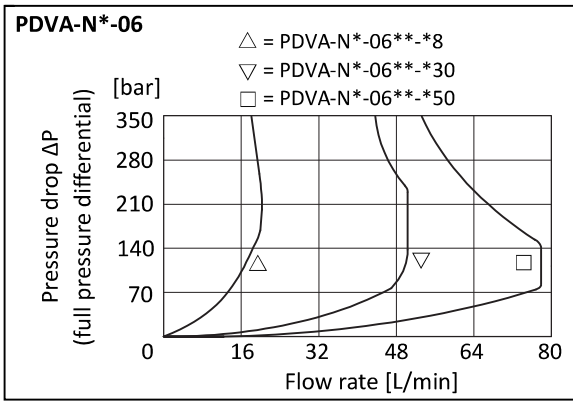


PDVA-N*-10

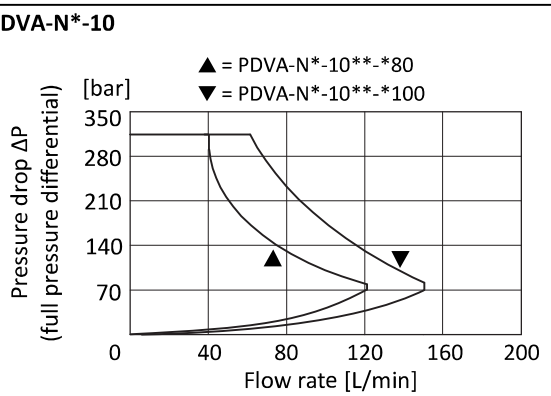


7.3. Performance limits

PDVA-N*-06



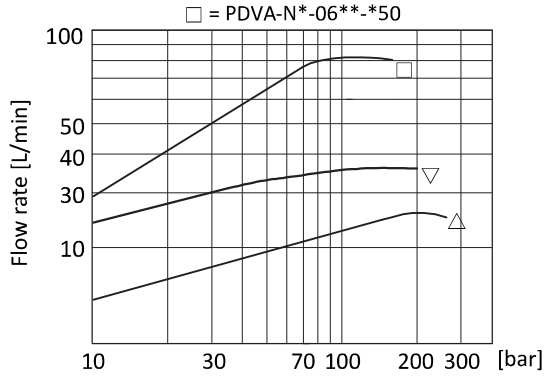
PDVA-N*-10



7.4. Flow-pressure drop (Q -ΔP) diagram @ 100% opening

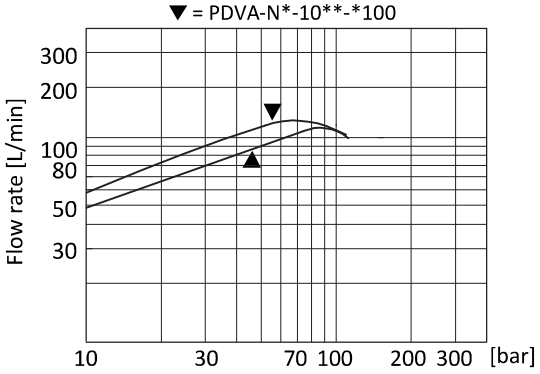
PDVA-N*-06

△ = PDVA-N*-06**-*8
▽ = PDVA-N*-06**-*30
□ = PDVA-N*-06**-*50



PDVA-N*-10

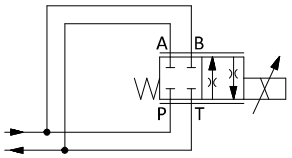
▲ = PDVA-N*-10**-*80
▼ = PDVA-N*-10**-*100



7.5. Double-passage application

Ports of single solenoid valve PDVA-N* with spool configuration E1 or E2 sometimes can be connected in parallel so as to make the valve serve as an enlarged proportional flow control valve, called double-passage application. The flow of double-passage connection is twice that of single-passage use.

Max operating pressure for double-passage application: 210bar



Typical double-passage connection for configuration E2

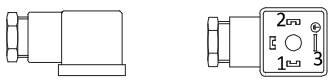
8. Proportional amplifier for PDVA-N*

8.1. Applicable amplifier

Valve code	Applicable amplifier	Command signal	Type of amplifier	Amplifier mounting
PDVA-NN-E0**	EP62-N-**-**	UA: 0 - ± 10V	non-OBE amplifier[a)]	DIN-rail format panel
PDVA-NN-J0**	EP22-N-**-**	IA: 4 - 20mA		
PDVA-NN-E1**	EP61-N-**-**	UB: 0 - +10V		
PDVA-NN-E2**	EP21-N-**-**	IA: 4 - 20mA		
PDVA-NN-J1**	EP11-N-UB-**	0 - +10V	DIN plug-in amplifier[b)]	DIN43650
PDVA-NN-J2**	EP11-N-IA-**	4 - 20mA		
PDVA-NB-E0**	EP32-N-UA-**	0 - ± 10V	OBE amplifier (see section 8.3)	OBE (on-board electronics)
PDVA-NB-J0**	EP32-N-IA-**	4 - 20mA		
PDVA-NB-E1** **PDVA-NB-**E2**	EP31-N-UB-**	0 - +10V		
PDVA-NB-J1** **PDVA-NB-**J2**	EP31-N-IA-**	4 - 20mA		

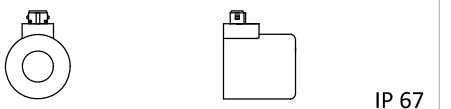
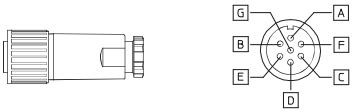
a) See the data sheets of non-OBE amplifier EP6 & EP2;
b) See the data sheet of DIN plug-in amplifier EP11.

8.2. Wiring connector interface

Valve code	Connector interface	Connector code	Figure
PDVA-NN	DIN 43650	KX-D-OL-24 (without LED) or KX-D-ML-24 (with LED) [1)]	 1: positive 2: negative 3: GND (NC)
	Deutsch DT-04-2P	KK-D-24 [1)] (special option "**K**")	 IP 67

1) To be ordered separately.

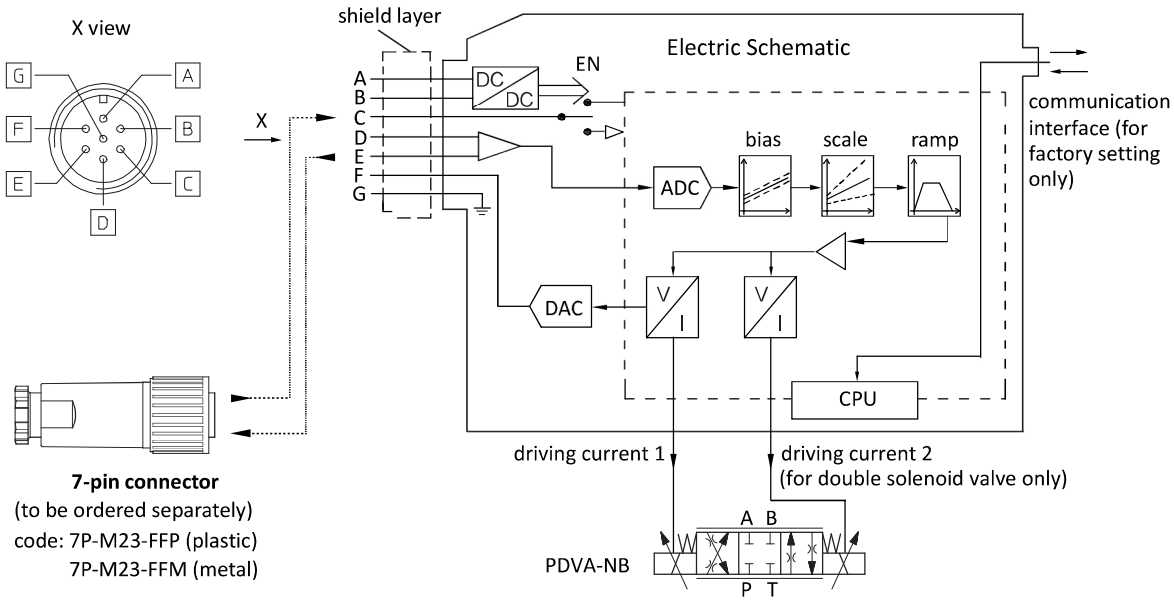
(8.2. Wiring connector interface)

Valve code	Connector interface	Connector code	Figure
PDVA-NN	AMP Junior Timer	KJ-D-24 [1] (special option "**J**")	 IP 67
	Lead Wire	KS-D-24 [1] (special option "**S**")	
PDVA-NB	7-pin main connector[1]	7P-M23-FFP (plastic) or 7P-M23-FFM (metal)	

1) To be ordered separately.

8.3. EP3*-N (open-loop OBE for PDVA-NB)

EP3*-N (open-loop OBE)	
Amplifier code	**EP32-N-UA-30** or **EP32-N-IA-30** (for double-solenoid valve; UA: 0 - ±10V; IA: 4 - 20mA)
	EP31-N-UB-30 or **EP31-N-IA-30** (for single solenoid valve; UB: 0 - +10V; IA: 4 - 20mA)



Wiring [a]	
PIN no.	**wiring descrition**
A	Power supply +: +24VDC ± 10% (power >= 40W)
B	Power supply 0 (for option Q, pin B also serves as the reference point for current monitoring)
C	Reference point for current monitoring test for valves without option Q
	Enable signal (for option Q only, +24V)
D	Input signal + (UA: 0 - ±10Vdc; IA: 4-20mA; UB: 0 - +10Vdc. "UB" is for single solenoid vavle only)
E	Input signal -
F	Monitoring output signal, max range: 0 - ±10Vdc for UA; 4-20mA for IA; 0 - +10Vdc for UB. (For option Q, tested with pin B as reference point; for other options, tested with pin C as reference)
	Fault alarming output signal (for option F only: +24V=functioning OK; 0=malfunction)
G	GND, normally NC [connected only when power not in conformity with VDE 0551(CEI 14/6)]
Electric characteristics	
Max. driving current	3000mA
Ambient temp.	-20 - + 60°C
Protection class	IP65
Cable length	max. 50m
Cable size	A, B: >= 0.75mm^2; other pins: >= 0.25mm^2

a) Shut off the power supply before wiring and shield cable is recommended.

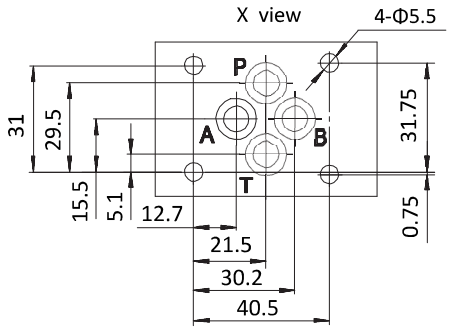
9. Mounting dimensions

9.1. Mounting dimension of PDVA-N*-06

Mounting interface	ISO: 4401-03-02-0-05; NG6	**Port size**	P, A, B, T: Φ7.5mm (max)
Mounting surface	Flatness 0.01/100 (ISO 1101), finish Ra 0.4		
Fastening bolts	M5X50, socket head, 4pcs, class 12.9	**"O"-ring seal**	P, A, B, T: Φ12.29×1.78 (ext. * wire), Sh=90
Tightening torque	8 Nm		

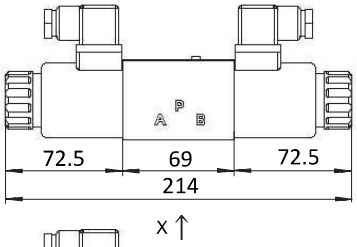
Mounting interface

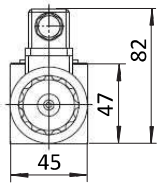
All dimensions in mm



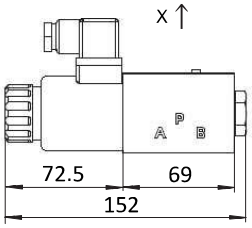
PDVA-NN-06
(without amplifier)

E0 & J0

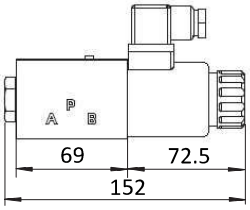




E1 & J1



E2 & J2

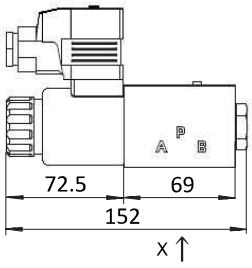


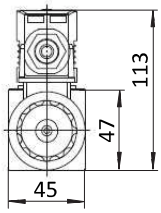
Mass:
Double solenoid vave: 2.1 kg
Single solenoid vave: 1.6 kg

PDVA-NN-06
(with plug-in amplifier EP11)

(single solenoid valve only)

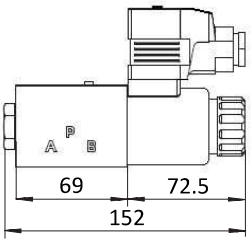
E1 & J1





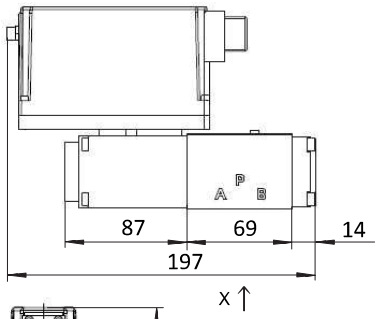
Mass: 1.7 kg

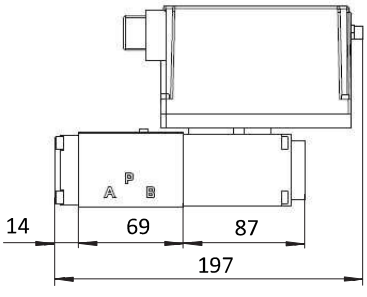
E2 & J2



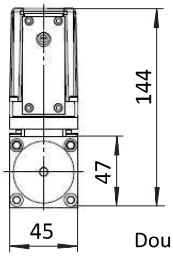
PDVA-NB-06

E1 & J1

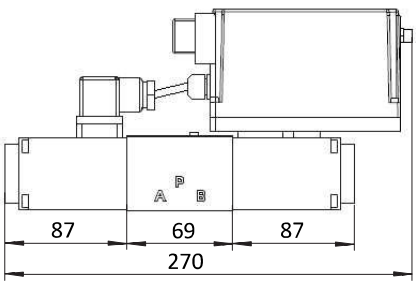




E2 & J2



Mass:
Double solenoid vave: 2.85 kg
Single solenoid vave: 1.95 kg



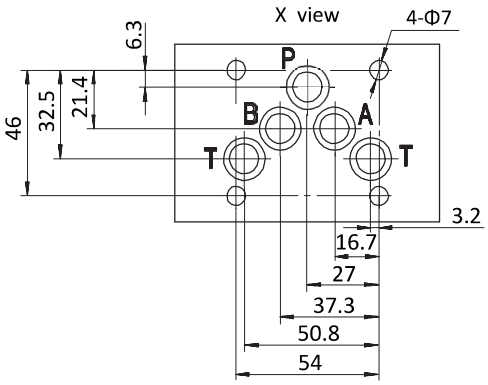
E0 & J0

9.2. Mounting dimension of PDVA-N*-10

Mounting interface	ISO: 4401-05-04-0-05; NG10	**Port size**	P, A, B, T: Φ11.5mm (max)
Mounting surface	Flatness 0.01/100 (ISO 1101), finish Ra 0.4		
Fastening bolts	M6X40, socket head, 4pcs, class 12.9	**"O"-ring seal**	P, A, B, T: Φ15.98×1.78 (ext. * wire), Sh=90
Tightening torque	15 Nm		

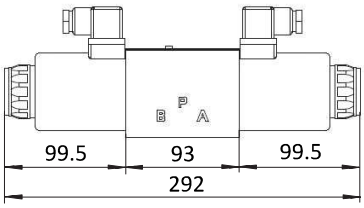
Mounting interface

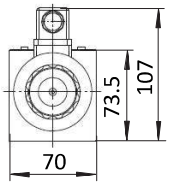
All dimensions in mm



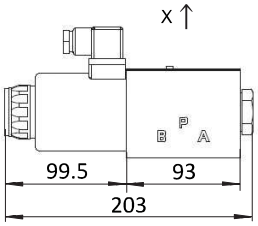
PDVA-NN-10
(without amplifier)

E0 & J0

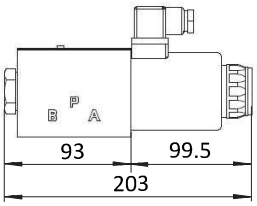




E2 & J2



E1 & J1

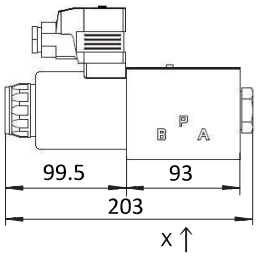


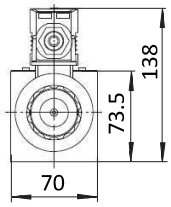
Mass:
Double solenoid vave: 5.9 kg
Single solenoid vave: 4.4 kg

PDVA-NN-10
(with plug-in amplifier EP11)

(single solenoid valve only)

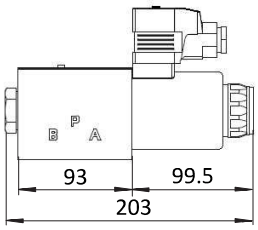
E2 & J2





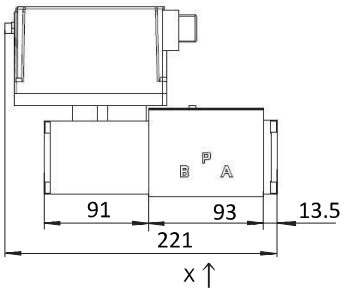
Mass: 4.5 kg

E1 & J1

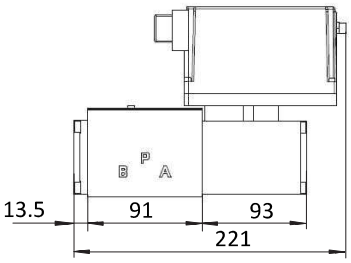


PDVA-NB-10

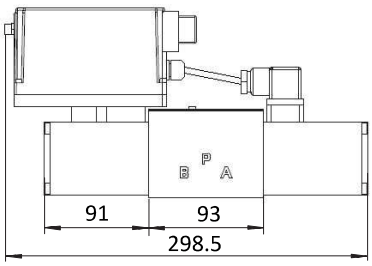
E2 & J2

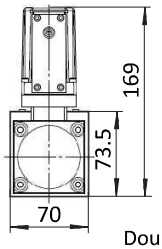


E1 & J1



E0 & J0





Mass:
Double solenoid vave: 6.2 kg
Single solenoid vave: 4.75 kg