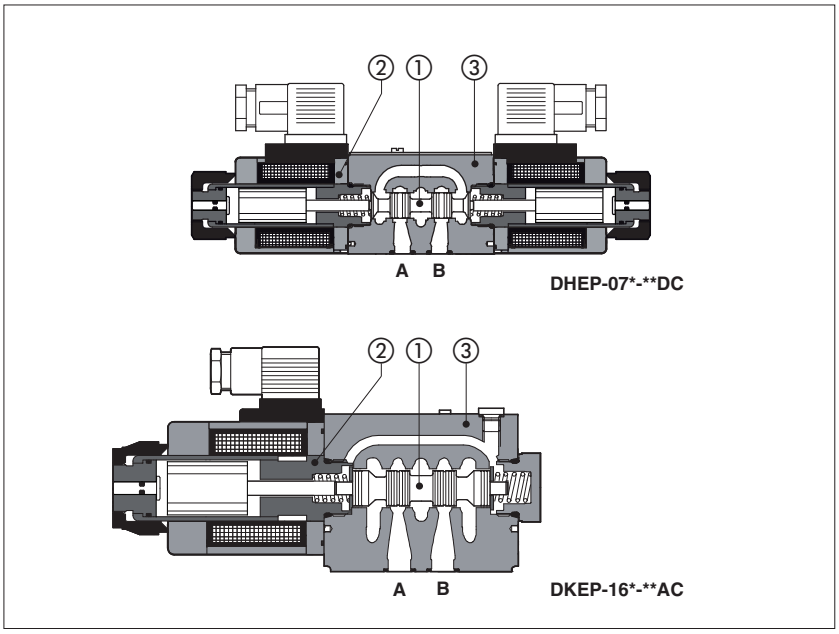
Solenoid directional valves Pmax 420 bar

direct operated, ISO 4401 size 06 and size 10



DHEP; DKEP
Spool type, direct operated solenoid valves with max pressure up to 420 bar for heavy duty applications.

They are equipped with threaded solenoids certified according the North American standard **cURus**
Single and double solenoid valves are available in two or three position configurations and with a wide range of interchangeable spools ①, see section 2.

Solenoids ② are made by:
- wet type screwed tube, different for AC and DC power supply, with integrated manual override pin c
- interchangeable coils, specific for AC or DC power supply, easily replaceable without tools - see section 5 for available voltages

Standard coils protection IP65 (once correctly assembled with relevant electric connectors).
The valve body ③ is made by high strength cast iron.

Mounting surface ISO 4401 size **06** and **10**
Max flow up to **80** and **150** l/min
Max pressure: **420** bar

1 MODEL CODE

DHEP - 0	63	1/2	/A	X	24 DC	**	/*

DHEP - 0
Directional control valves
DHEP-0 = Size 06
DKEP-1 = Size 10

63
Valve configuration, see table 2
61 = single solenoid, center plus external position, spring centered
63 = single solenoid, 2 external positions, spring offset
67 = single solenoid, center plus external position, spring offset
71 = double solenoid, 3 positions, spring centered
75= double solenoid, 2 external positions, with detent

1/2
Spool type, see table 2.

/A
Options, see note 1 at section 5

X
00-AC = AC solenoids without coils
00-DC = DC solenoids without coils
X = without connector
See note 2 at section 5 for available connectors, to be ordered separately
Coils with special connectors, see section 7
XJ = AMP Junior Timer connector
XK = Deutsch connector
XS = Lead Wire connection

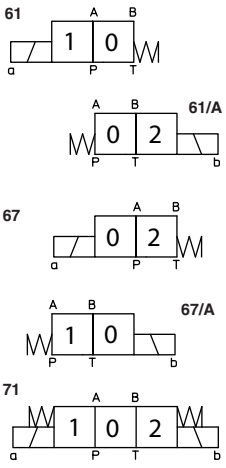
24 DC
Voltage code, see section 6

******
Series number

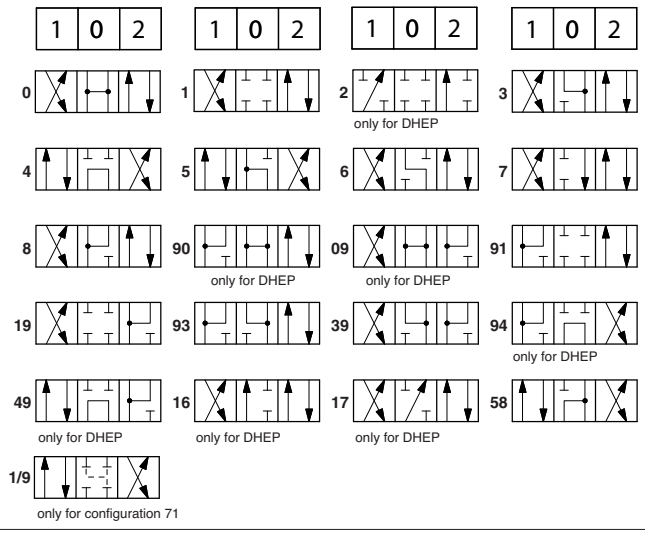
/*
Seals material, see sect. 3, 4:
- = NBR
PE = FKM
BT = HNBR

2 CONFIGURATIONS and SPOOLS

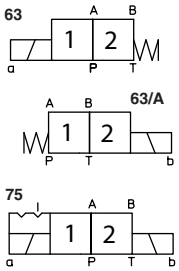
Configurations



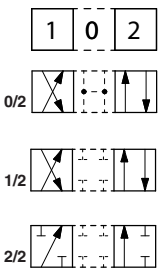
Spools



Configurations



Spools



3 MAIN CHARACTERISTICS OF DHE* DIRECTIONAL VALVES

Assembly position / location	Any position
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)
MTTFd values according to EN ISO 13849	150 years, for further details see technical table P007
Ambient temperature	from -30°C to +70°C (standard seals) -20°C to +70°C (/PE seals) -40°C to +60°C (/BT seals)
Flow direction	As shown in the symbols of section 2
Operating pressure	Ports P,A,B: **420** bar; Port T **210** bar for DC version; **160** bar for AC version
Rated flow	See diagrams Q/Δp at section 8, 12
Maximum flow	**DHEP 80 l/min, DKEP 150 l/min**, see operating limits at section 9, 13

3.1 Coils characteristics

Insulation class	**H** (180°C) for DC coils **F** (155°C) for AC coils Due to the occuring surface temperatures of the solenoid coils, the European standards EN ISO 13732-1 and EN ISO 4413 must be taken into account
Protection degree to DIN EN 60529	**IP 65** (with connectors 666, 667, 669 or E-SD correctly assembled)
Relative duty factor	100%
Supply voltage and frequency	See electric feature 5
Supply voltage tolerance	± 10%
Certification	**cURus** North American Standard

4 SEALS AND HYDRAULIC FLUIDS - for other fluids not included in below table, consult our technical office

Seals, recommended temperature fluid	NBR seals = -20°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals = -20°C ÷ +80°C HNBR seals = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C		
Recommended viscosity	20÷100 mm²/s - max allowed range 15 ÷ 380 mm²/s		
Fluid contamination class	ISO 4406 class 20/18/15 NAS 1638 class 9, in line filters of 10 μm (β10 ≥75 recommended)		
Hydraulic fluid	**Suitable seals type**	**Classification**	**Ref. Standard**
Mineral oils	NBR, FKM, HNBR	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR, HNBR	HFC	

5 NOTES FOR DHEP AND DKEP

1 Options

A = Solenoid mounted at side of port B (only for single solenoid valves). In standard versions, solenoid is mounted at side of port A.
WP = prolonged manual override protected by rubber cap.

⚠ The manual override operation can be possible only if the pressure at T port is lower than 50 bar.

WPD/HE-DC = (only for DHEP-DC) manual override with detent, to be ordered separately, see tab. K150
WPD/KE-DC = (only for DKEP-DC) manual override with detent, to be ordered separately, see tab. K150

2 Type of electric/electronic connector DIN 43650, to be ordered separately

666 = standard connector IP-65, suitable for direct connection to electric supply source.
667 = as 666, but with built-in signal led.
669 = with built-in rectifier bridge for supplying DC coils by alternate current (AC 110V and 230V - Imax 1A).
E-SD = **(only for DHEP)** electronic connector which eliminates electric disturbances when solenoid valves are de-energized.

3 Spools for DHEP

- spools type **0** and **3** are also available as **0/1** and **3/1** with restricted oil passages in central position, from user ports to tank.
- spools type **1, 4**, **5** and **58** are also available as **1/1, 4/8, 5/1** and **58/1.** They are properly shaped to reduce water-hammer shocks during the swiching.
- spools type **1, 1/2, 3, 8** are available as **1P, 1/2P, 3P, 8P** to limit valve internal leakages.
- Other types of spools can be supplied on request.

Spools for DKEP

- spools type **0** and **3** are also available as **0/1** and **3/1** with restricted oil passages in central position, from user ports to tank.
- spools type **1** is also available as **1/1**, properly shaped to reduce the water-hammer shocks during the switching.
- spool type **1/9** has closed center in rest position but it avoids the pressurization of A and B ports due to the internal leakages.
- other types of spools can be supplied on request.

6 ELECTRIC FEATURES

External supply nominal voltage ± 10%	Voltage code	Type of connector	Power consumption (2)	Code of spare coil DHEP	Code of spare coil DKEP
12 DC	**12 DC**	666 or 667	30 W (DHEP) 36 W (DKEP)	COE-12DC	CAE-12DC
14 DC	**14 DC**			COE-14DC	CAE-14DC
24 DC	**24 DC**			COE-24DC	CAE-24DC
28 DC	**28 DC**			COE-28DC	CAE-28DC
110 DC	**110 DC**			COE-110DC	CAE-110DC
125 DC	**125 DC**			COE-125DC	-
220 DC	**220 DC**			COE-220DC	CAE-220DC
110/50/60 AC	**110/50/60 AC**		58 VA (DHEP) 85 VA (DKEP) (3)	COE-110/50/60AC (1)	CAE-110/50/60AC (1)
230/50/60 AC	**230/50/60 AC**			COE-230/50/60AC (1)	CAE-230/50/60AC (1)
115/60 AC	**115/60 AC**			COE-115/60AC	CAE-115/60AC
230/60 AC	**230/60 AC**			COE-230/60AC	CAE-230/60AC
110/50/60 AC	**110 RC**	669	30 W (DHEP)	COE-110DC	CAE-110DC
230/50/60 AC	**220 RC**			COE-220DC	CAE-220DC
110/50/60 AC	**110 DC**		36 W (DKEP)	COE-110DC	CAE-110DC
230/50/60 AC	**220 DC**			COE-220DC	CAE-220DC

(1) In case of 60 Hz voltage frequency the performances are reduced by 10÷15% and the power consumption is 80 VA for DHEP and 90 VA for DKEP.

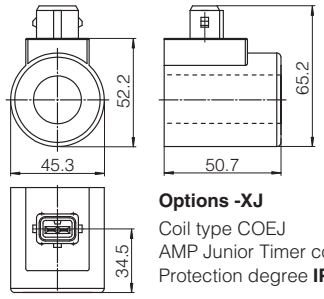
(2) Average values based on tests performed at nominal hydraulic condition and ambient/coil temperature of 20°C.

(3) When solenoid is energized, the inrush current is approx 3 times the holding current. Inrush current values correspond to a power consumption of about 280 VA for DHEP and 320 VA for DKEP.

7 COIL WITH SPECIAL CONNECTORS only for voltage supply 12, 14, 24, 28 VDC

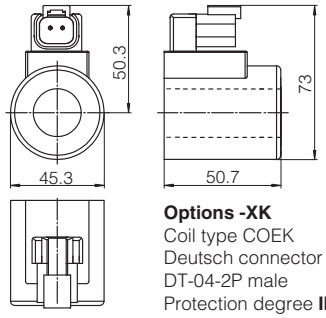
COIL COE for DHEP

AMP Junior timer connector



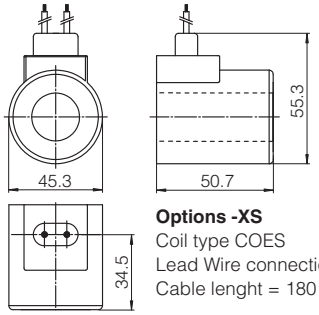
Options -XJ
Coil type COEJ
AMP Junior Timer connector
Protection degree **IP67**

Deutsch connector DT-04-2P



Options -XK
Coil type COEK
Deutsch connector
DT-04-2P male
Protection degree **IP67**

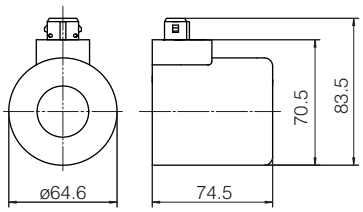
Lead Wire connection



Options -XS
Coil type COES
Lead Wire connection
Cable lenght = 180 mm

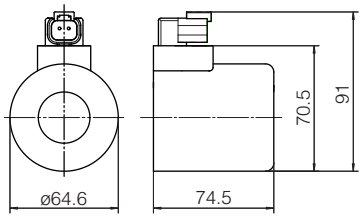
COIL CAE for DKEP

AMP Junior timer connector



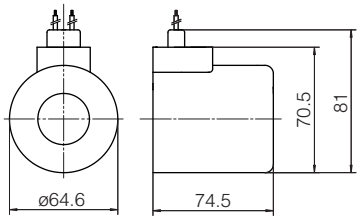
Options -XJ Coil type CAEJ
AMP Junior Timer connector
Protection degree **IP67**

Deutsch connector DT-04-2P



Options -XK Coil type CAEK
Deutsch connector
DT-04-2P male
Protection degree **IP67**

Lead Wire connection

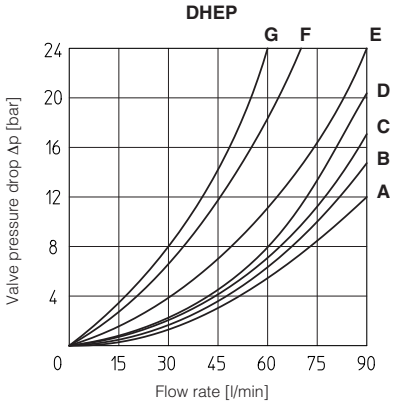


Options -XS Coil type CAES
Lead Wire connection
Cable lenght = 180 mm

Note: for the electric characteristics refer to standard coils features - see section 6

8 Q/ΔP DIAGRAMS based on mineral oil ISO VG 46 at 50°C

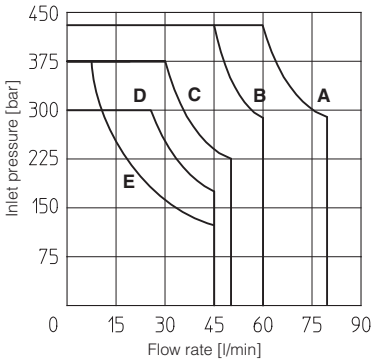
Flow direction / Spool type	P→A	P→B	A→T	B→T	P→T
0, 0/1	A	A	C	C	D
1, 1/1	D	C	C	C	
3, 3/1	D	D	A	A	
4, 4/8, 5, 5/1, 58, 58/1 09, 90, 91, 93, 94	F	F	G	C	E
1/2, 0/2	D	D	D	D	
6, 7	D	D	D	D	
8	A	A	E	E	
2	D	D			
2/2	F	F			



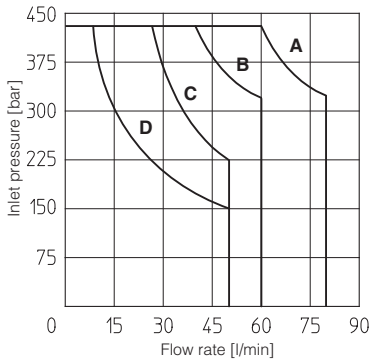
9 OPERATING LIMITS based on mineral oil ISO VG 46 at 50°C

The diagrams have been obtained with warm solenoids and power supply at lowest value (V_{nom} - 10%). The curves refer to application with symmetrical flow through the valve (i.e. P→A and B→T). In case of asymmetric flow and if the valves have the devices for controlling the switching times the operating limits must be reduced.

DHEP - AC



DHEP - DC



DHEP

Curve	Spool type AC	Spool type DC
A	1, 1/2, 8	0, 0/1, 1, 1/2, 3, 8
B	0, 0/1, 0/2, 1/1	0/2, 1/1, 6, 7
C	3, 3/1	3/1, 4, 4/8, 5, 5/1, 19, 39, 58, 90, 91, 93, 94
D	4, 4/8, 5, 5/1, 6, 7, 19, 39, 58, 91, 93, 94	2, 2/2
E	2, 2/2	-

10 SWITCHING TIMES (average values in msec)

Valve	Switch-on AC	Switch-off AC	Switch-on DC	Switch-off DC
DHEP	10 - 25	20 - 40	30 - 50	15 - 25

Test conditions:

- 36 l/min; 150 bar
- nominal voltage
- 2 bar of counter pressure on port T
- mineral oil: ISO VG 46 at 50°C.

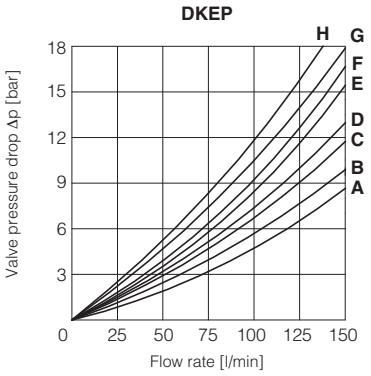
The elasticity of the hydraulic circuit and the variations of the hydraulic characteristics and temperature affect the response time.

11 SWITCHING FREQUENCY

Valve	AC (cycles/h)	DC (cycles/h)
DHEP + 666 / 667	7200	15000

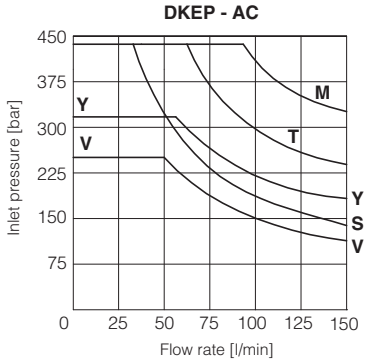
12 Q/ΔP DIAGRAMS based on mineral oil ISO VG 46 at 50°C

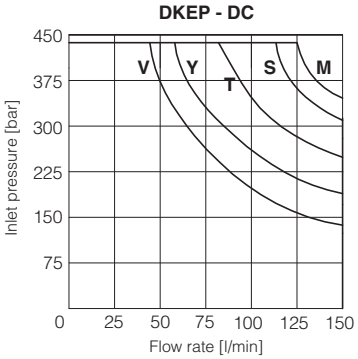
Flow direction / Spool type	P→A	P→B	A→T	B→T	P→T	B→A
0, 0/1, 0/2, 2/2	A	A	B	B		
1, 1/1, 1/3, 6, 8	A	A	D	C		
3, 3/1, 7	A	A	C	D		
4	B	B	B	B	F	
5	A	B	C	C	G	
1/2	B	C	C	B		
2/7	D			F		
5/7	B			A	E	
19	A	D	C			H



13 OPERATING LIMITS based on mineral oil ISO VG 46 at 50°C

The diagrams have been obtained with warm solenoids and power supply at lowest value (V_{nom} - 10%). The curves refer to application with symmetrical flow through the valve (i.e. P→A and B→T). In case of asymmetric flow and if the valves have the devices for controlling the switching times the operating limits must be reduced.





DKEP

Curve	Spool type AC	Spool type DC
M	0/1, 5/7, 1/3	0, 0/1, 1, 1/1, 3, 3/1, 1/2, 0/2, 8
S	2/7, 4, 5, 19	1/3, 5/7, 6, 7
Y	1, 1/2, 0/2	4, 5, 2/7
V	6, 7, 8, 2/2	2/2
T	0, 1/1, 3, 3/1	19
U	-	4, 5
Z	-	0/1, 1/1, 3/1

14 SWITCHING TIMES (average values in msec)

Valve	Switch-on AC	Switch-on DC	Switch-off AC	Switch-off DC
DKEP + 666 / 667	40	60	25	35

Test conditions:

- 50 l/min; 150 bar
- nominal supply voltage
- 2 bar of back pressure on port T
- mineral oil ISO VG 46 at 50°C

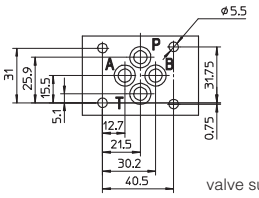
The elasticity of the hydraulic circuit and the variations of the hydraulic characteristics and temperature affect the response time.

15 SWITCHING FREQUENCY

Valve	AC (cycles/h)	DC (cycles/h)
DKEP + 666 / 667	7200	15000

16 INSTALLATION DIMENSIONS [mm]

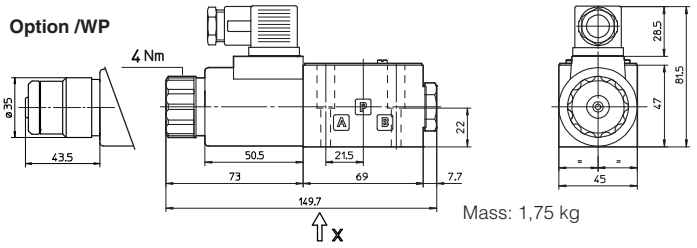
ISO 4401: 2005
Mounting surface: 4401-03-02-0-05
Fastening bolts: 4 socket head screws:
M5x30 class 12.9
Tightening torque = 8 Nm
Seals: 4 OR 108
Ports P,A,B,T: Ø = 7.5 mm (max)



valve surface

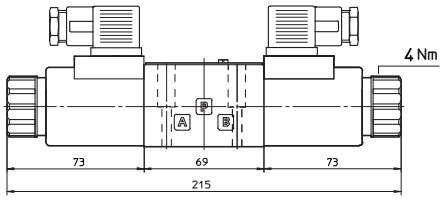
P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT

DHEP-06(DC)



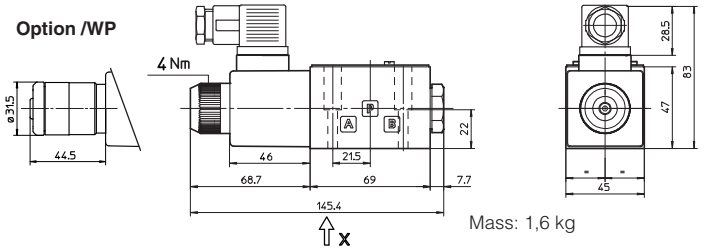
Mass: 1,75 kg

DHEP-07(DC)



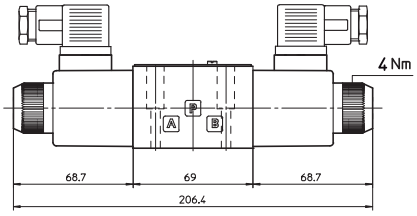
Mass: 2 kg

DHEP-06(AC)



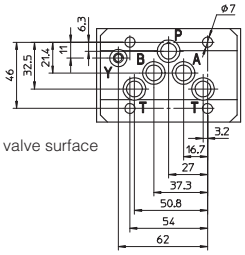
Mass: 1,6 kg

DHEP-07(AC)



Mass: 1.9 kg

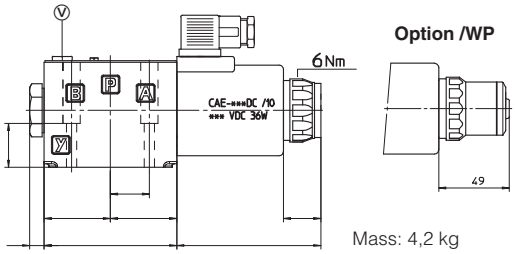
ISO 4401: 2005
Mounting surface according to 4401-05-05-0-05
(without X port, Y port optional)
Fastening bolts:
4 socket head screws M6x40 class 12.9
Tightening torque = 15 Nm
Seals: 5 OR 2050 and 1 OR 108
Ports P,A,B,T: Ø = 11.5 mm (max)
Ports Y: Ø = 5 mm



valve surface

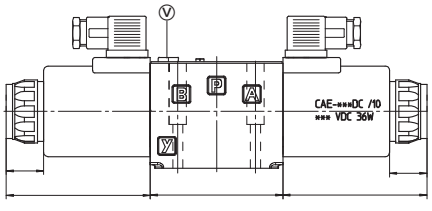
P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT
Y = DRAIN PORT (only for option /Y)
For the max pressures on ports, see section [3]

DKEP-16*-DC



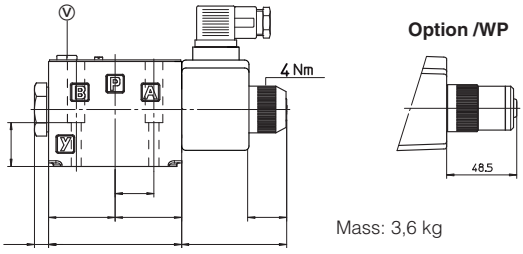
Mass: 4,2 kg

DKEP-17*-DC



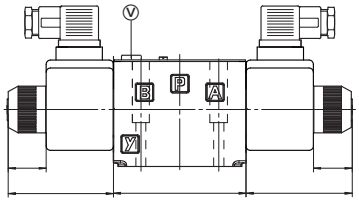
Mass: 5,7 kg

DKEP-16*-AC



Mass: 3,6 kg

DKEP-17*-AC


Mass: 4,3 kg

Overall dimensions refer to valves with connectors type 666