4/2 and 4/3 Way Directional Control Valves Pilot Operated

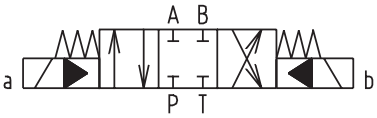
RPEH4-16

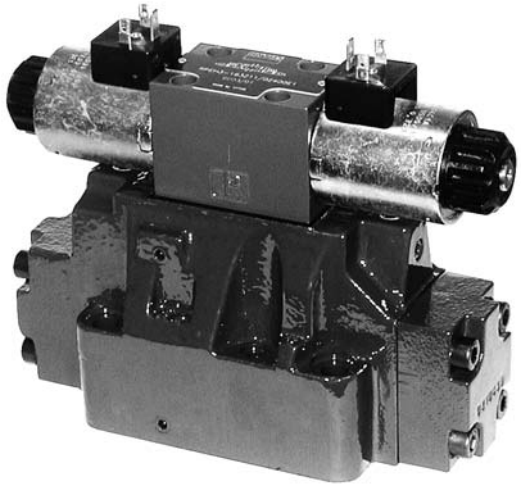
Size 16 (D 07) • 320 bar (4600 PSI) • 300 L/min (80 GPM)

HA 4023
12/2007

Replaces
HA 4023 2/2003

- ❑ **Solenoid pilot operated directional valves (RPEH)**
- ❑ **Hydraulic pilot operated directional valves (RPH)**
- ❑ **Small energy input**
- ❑ **Manual overrides optional (only for RPEH)**
- ❑ **Installation dimensions to DIN 24 340 / ISO 4401 / CETOP RP121-H**

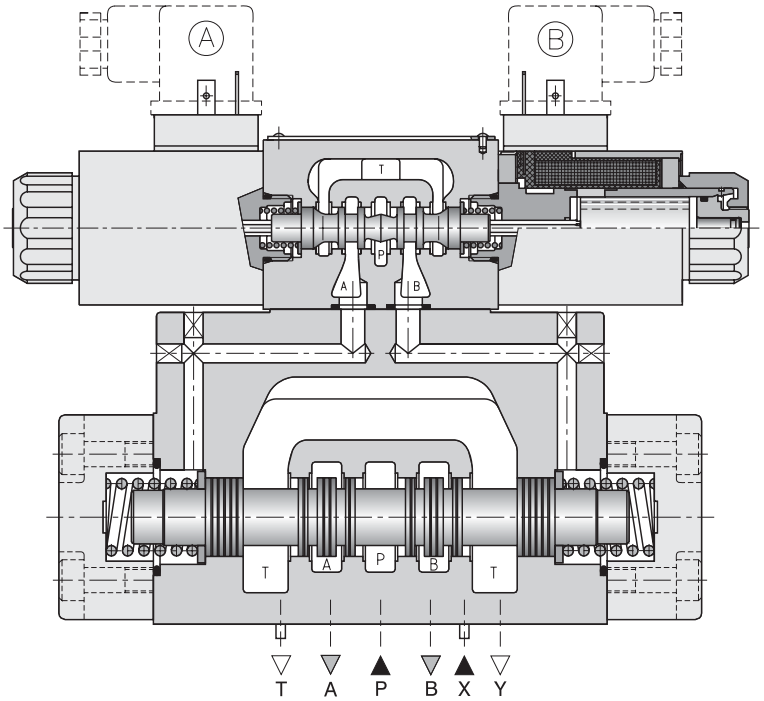




Functional Description

The RPEH solenoid operated - hydropiloted valves are consisting of an RPE3-06 type solenoid operated directional control valve (see data sheet HA 4010) that operates a 4-way hydropiloted control valve with a connection surface in accordance with the ISO 4401 standards. They are available in various configurations and spool types.
The pilot and the drain connections can be made internal or external by inserting or removing the accordant threaded plugs located in the main directional control valve.

A wide range of configurations and different solenoid operated - hydropiloted directional control valve spool positions are available:
– 4-way, 3-position directional control valve, with two solenoids; positioning of the spool in center position is obtained with centering springs.
– 4-way, 2-position directional valve, with one solenoid and one return spring or two solenoids and detent of the spool position.
The basic surface treatment of the valve housing is phosphate coated and the solenoids are zinc coated.



Ordering Code

RP ☐ 4-16 ☐ ☐ / ☐ ☐ ☐ / ☐ /13- ☐ ☐ ☐ / ☐

Directional Control Valve Pilot Operated

Type of control
electrohydraulically operated **EH**
hydraulically operated **H**

Design series

Valve size

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table functional symbols

Controls
if not required **no designation**
main spool shifting speed control **D**
shifting speed control, with orifice (0.8 mm) in port P of solenoid pilot valve **PF**

Piloting
if not required **no designation**
external piloting (see note herebelow) **E**

Seals
no designation NBR
V FPM (Viton)

Manual overide
no designation standard
N1 covered with retaining nut
N2 covered with rubber boot

Type of solenoid coil
E1 with terminal for the connector*
E2 with integrated quenching diode and terminal for the connector*
E5 with integrated rectifier and terminal for the connector*
* from EN 1745301-803-A

Rated supply voltage of solenoids *
(at the coil terminals)

01200 12 V DC / 2.72 A
02400 24 V DC / 1.29 A
12060 120 V AC / 0.35 A / 50 (60) Hz
23050 230 V AC / 0.17 A / 50 (60) Hz

The AC coils correspond with E5 type.
* Other voltages per request.

Series number

Check valve incorporated in P-line
no designation if not required
C3 with check valve (see page 7)

Drain
no designation external drain which is recommended when the valve is used with back pressure on the outlet
I internal drain

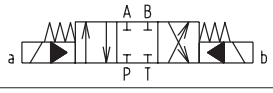
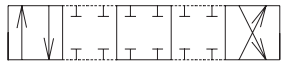
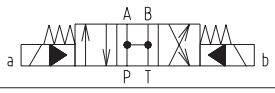
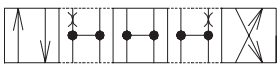
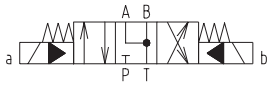
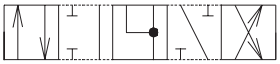
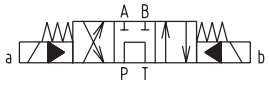
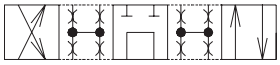
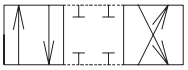
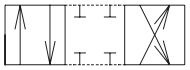
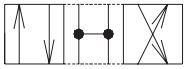
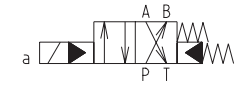
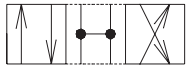
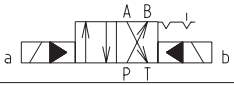
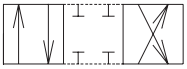
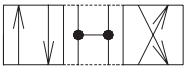
Note:
Piloting must always be external for valves with the H11 type pilot valve (available on request). Also valve must have external piloting for spools with P and T connected in the center position. Internal piloting is possible only with a C3 version valve (see page 7), or by installing a check valve with a setting of min. 5 bar on the outlet line. In this case the valve must have external drainage.
Piloting must always be external for valves with the **RPH** type hydraulic control valve (available on request).

Technical Data

Valve size	mm (US)	16 (D 07)
Maximum flow rate from port P to A, B, T	L/min (GPM)	300 (80)
Max. operating pressure ports P, A, B port T port T (external drain version)	bar (PSI)	 320 (4600) 210 (3000) 250 (3600)
Pressure drop	bar (PSI)	see Pressure Drop Δp-Q
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51524
Fluid temperature range for NBR seals	°C (°F)	-30 ... +80 (-22 ... +176)
Fluid temperature range for FPM seals	°C (°F)	-20 ... +80 (-4 ... +176)
Ambient temperature max.	°C (°F)	+50 (+122)
Viscosity range	mm^2/s (SUS)	20 ... 400 (98 ... 1840)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406
Service life	cycles	10^7
Enclosure type to EN 60529		IP 65
Weigt - RPEH4-162 - RPEH4-163	kg (lbs)	8,5 (19) 9,1 (20)

Functional Symbols

Symbols are referred to the solenoid valve RPEH. For the hydraulic control version RPH please verify the connection scheme (see page 7).

Three positions with spring centering			Three positions with spring centering		
Z11			**H11**		
Y11			**C11**		
Two positions with return spring			**Two positions with return spring**		
R51			**X51**		
R52			**X52**		
Two positions with mechanical detent on pilot valve					
J17					
J27					

Besides the diagrams shown, which are the most frequently used, other special versions are available: consult our technical department for their identification, feasibility and operating limits.

Performance Characteristic

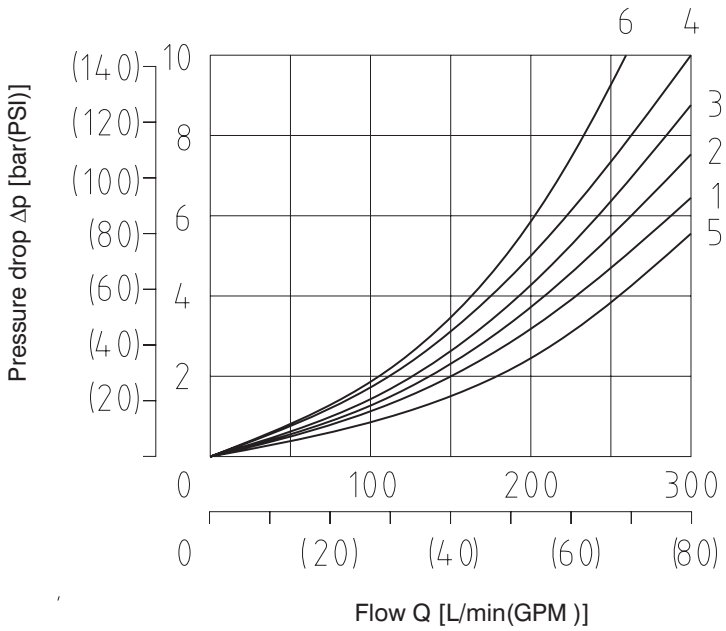
Pressures in bar (PSI)	MIN.	MAX.
Pilot pressure	5 (72.5)	210 (3043)
Pressure on line T with internal drainage	-	140 (2029)
Pressure on line T with external drainage	-	250 (3623)

Maximum flow rates in L/min (GPM)	PRESSURES	
	210 bar (3045 PSI)	320 bar (4640 PSI)
Spool type C11	250 (66)	200 (53)
All other spools	300 (80)	250 (66)

Pressure Drop Δp-Q

Measured at $\nu = 32\ mm^2/s$ (156 SUS) and t = 40 °C (104 °F)

Pressure drop Δp related to flow rate.



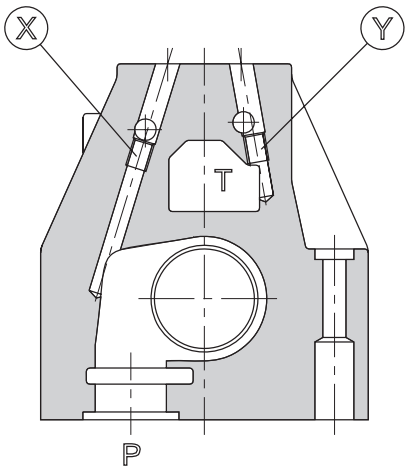
Spool type	Spool position	Connections				
		P - A	P - B	A - T	B - T	P - T
		Curves on graph				
Z11	Energized	1	1	2	3	
H11	De-energized					6*
	Energized	5	5	1	2	
Y11	De-energized			4•	4°	
	Energized	1	1	1	2	
C11	De-energized					6
	Energized	6	6	3	4	
R51, R52, X51, X52	De-energized	1			1	
	Energized		1	2		
J17, J27	Energized	1	1	2	3	

* A-B blocked • B blocked ° A blocked

Pilot and Drain

The RPEH valves are available with pilot and drain, both internal and external. The version with external drain allows for a higher back pressure on the outlet.

Type of valve		Plug assembly	
		X	Y
RPEH4-16/***	Internal pilot and external drain	NO	YES
RPEH4-16/*I**	Internal pilot and internal drain	NO	NO
RPEH4-16/*E**	External pilot and external drain	YES	YES
RPEH4-16/*EI**	External pilot and internal drain	YES	NO



X: plug M6 x 8 for external pilot
Y: plug M6 x 8 for external drain

Electrical Features

Solenoids
The operating solenoids are DC solenoids. For AC supply the solenoids are provided with rectifier which are integrated in the DIN connector socket as part of the solenoid. The connectors can be turned by 90°. By loosening the nut, the solenoids can be turned or replaced without interfering with any seals of the valve.In the case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override, provided the pressure in T-port does not exceed 25 bar.

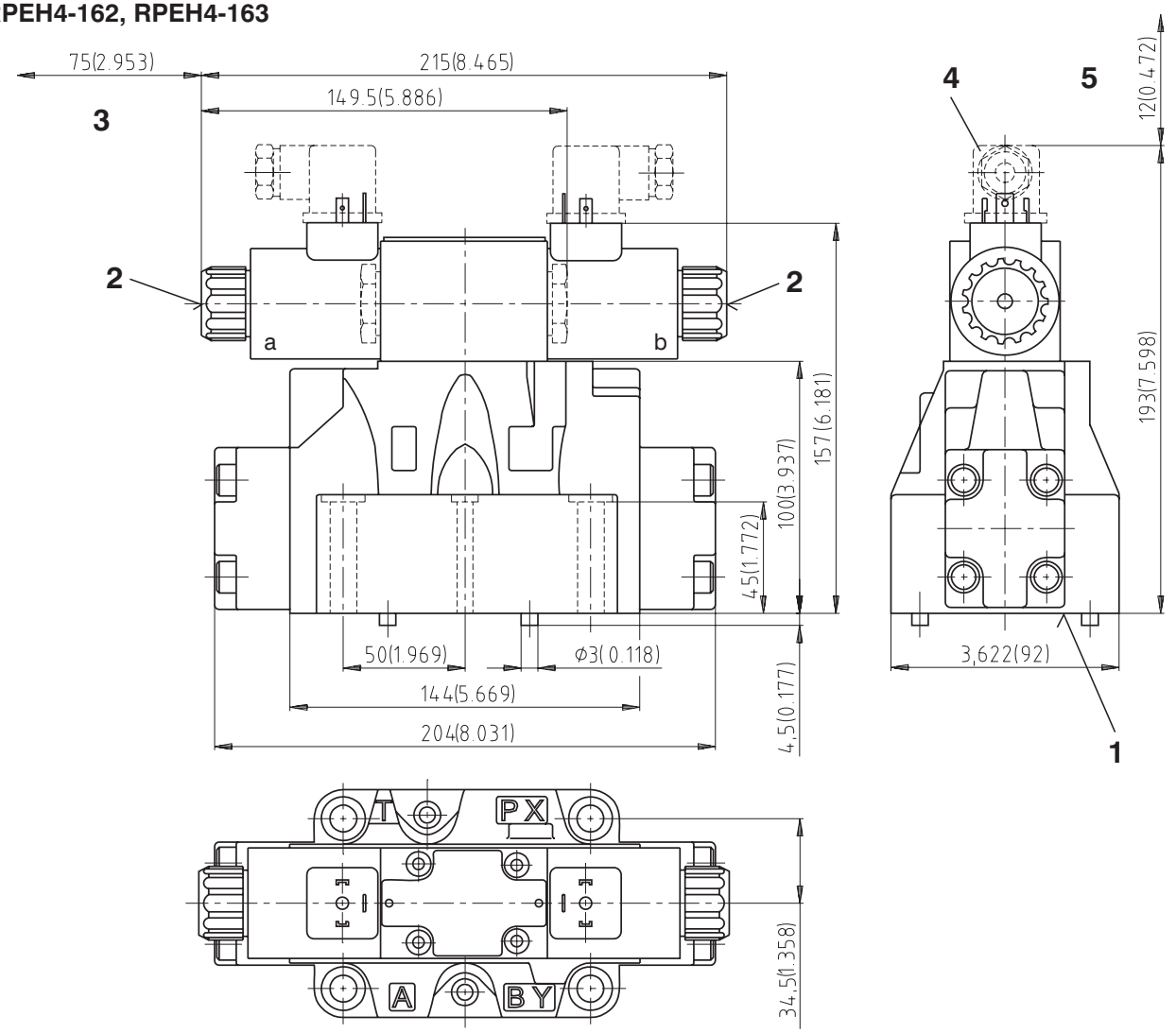
		DC solenoid	AC solenoid
Max. allowable voltage variation	%	-10 ... +6	±10
Max. switching frequency	1/h	10 000	
Switching times ±10 %, energizing (two position)	ms	70	60
Switching times ±10 %, de-energizing (two position)	ms	80	80
Switching times ±10 %, energizing (three position)	ms	50	80
Switching times ±10 %, de-energizing (three position)	ms	60	60
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to EN 60 529		IP 65	

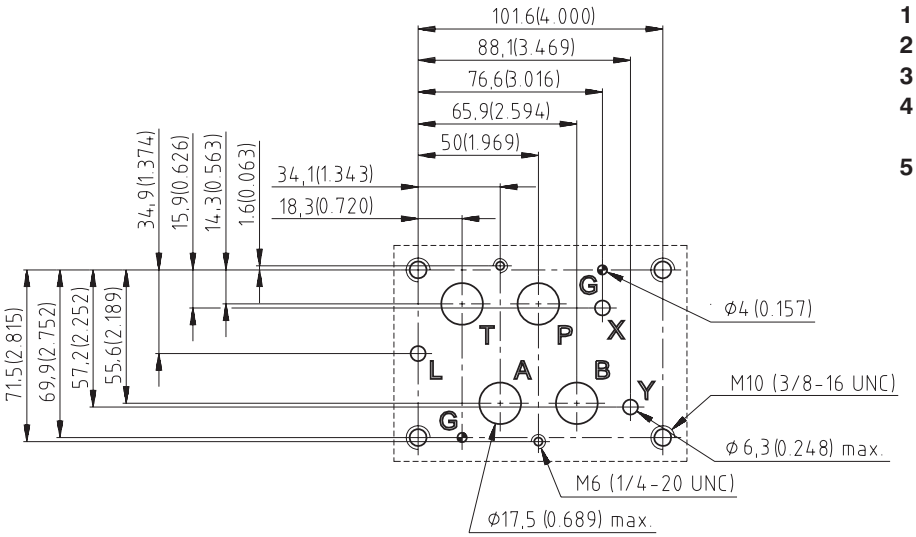
The values indicated refer to a solenoid valve operating with piloting pressure 100 bar, viscosity of 32 mm^2/s and with PA and BT connections. The switch on times are obtained from the time the spool switches over. The switch off times are measured at the time pressure variation occurs in the line.

Valve Dimensions

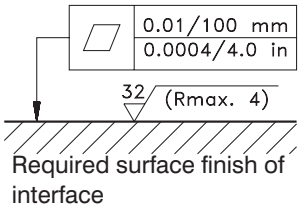
Dimensions in millimeters (inches)

RPEH4-162, RPEH4-163





1 Mounting surface with seal rings
2 Manual override
3 Space required to remove coil
4 Electrical connector
(must be ordered separately)
5 Space required to remove connector

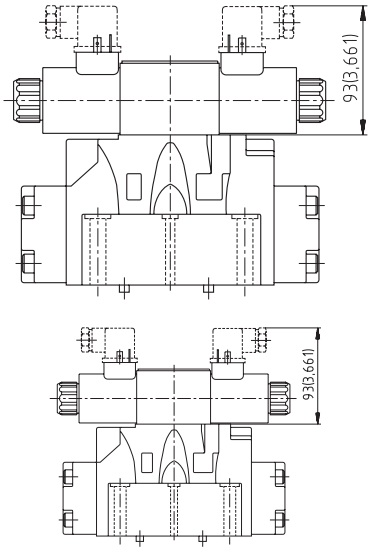


Required surface finish of interface

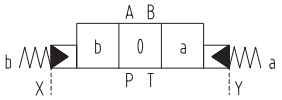
Single valve fastening:	4 bolts M10 x 60 * 2 bolts M6 x 60 *	* Bolts is not supplied
Bolt torque:	M10 x 60: 40 Nm(29.5 ft-lbs) - bolts A 8.8 M6 x 60: 8 Nm(5.9 ft-lbs) - bolts A 8.8	
Threads of mounting holes:	M6 x 18; M10 x 18	
Seal rings:	4 O-rings type 22.22 x 2.62 2 O-rings type 10.82 x 1.78	

Type of Command

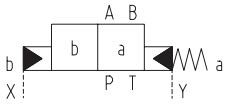
Solenoid control: RPEH
The valve is supplied with a pilot solenoid valve type RPE3-06.



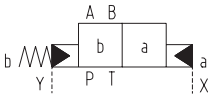
Hydraulic control: RPH
The valve is supplied with a cross-connection cover-plate.
X and Y connections are used for the hydraulic control of the valve.



RPH4-163



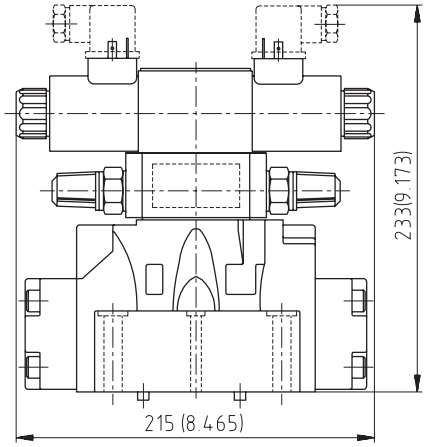
RPH4-162



RPH4-162

Controls

Control of the main spool shifting speed: D
By placing a 2VS3-06 type double flow control valve between the pilot solenoid valve and the hydropiloted valve, the piloted flow rate can be controlled and therefore the shifting speed can be varied. Add the letter **D** to the identification code to request this device.



Manual Override

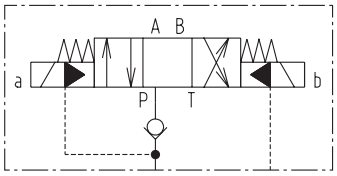
Whenever the solenoid valve installation may involve exposure to atmospheric agents or be used in tropical climates, the manual override, boot protection is recommended. Add the suffix **N1**or **N2** to request this device.

Electrical Connector

The solenoid valves are never supplied with connector. Connectors must be ordered separately.

Special Configurations C3

Check valve incorporated on line P: C3
Valve RPEH is available upon request with check valve incorporated on line P. This is particularly useful to obtain the necessary piloting pressure when the main control valve, in the rest position, has line P connected to the T outlet. The cracking pressure is 5 bar. Add **C3** to the identification code for this request.



Installation

Configurations with centering and recall springs can be mounted in any position; type J17, J27 valves - without springs and with mechanical retention must be mounted with the longitudinal axis horizontal. Valve fastening takes place by means of screws or tie rods, placing the valve on a flat surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.

Spare Parts

Seal kit

Design		Dimensions, number			Ordering number
		O-ring	Square ring	Back-up ring	
Head valve size 16 (D 07)	Standard - NBR	22.22 x 2.62 (4 pcs.)	-	-	21833700
		10.82 x 1.78 (2 pcs.)			
		31.42 x 2.62 (2 pcs.)			
	Viton	22.22 x 2.62 (4 pcs.)			21833800
		10.82 x 1.78 (2 pcs.)			
		31.42 x 2.62 (2 pcs.)			
Throttle valve 2VS3-06-CS type number 15929600	Standard - NBR	18 x 2.65 (2 pcs.)	9.25 x 1.68 (4 pcs.)	6.73 x 9.43 x 1.14 (2 pcs.)	15936300
		6.9 x 1.8 (2 pcs.)	-	17.83 x 22.19 x 1.14 (2 pcs.)	
	Viton	17.12 x 2.62 (2 pcs.)		9.43 x 6.73 x 1.14 (2 pcs.)	15936600
		9.25 x 1.78 (4 pcs.)		17.83 x 22.19 x 1.14 (2 pcs.)	
		6.75 x 1.78 (2 pcs.)		-	
Control valve	see data sheet ARGO-HYTOS - HA 4010 - RPE3-06				

Mounting bolt

	Dimensions, number		Tightening torque	Ordering number
Fixation of extension of valve	Bolt M5 x 45	DIN 912-10.9 (4pcs.)	8.9 Nm (6.6 ft-lbs)	15845100
	Bolt M5 x 98 - 8G	(4 pcs.)		16103700
	Nut M5			

Other

	Design	
Cover plate	PA, BT	15934200
	PB, TA	15933700

Caution!

- Service valve without range stated parameter consultation with manufacturer.
- Detaile information at control vavle - see data sheet RPE3-06, HA 4010
- The packing foil is recyclable.
- The protective plate can be returned to manufacturer.
- The technical information regarding the product presented in this data sheet is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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