

**PRADIS**

**REFERENCE BOOK ON THE MODELS  
MODULE PNEUMATIC**

**THE SOFTWARE FOR SIMULATION OF NON-  
STATIONARY PROCESSES IN MECHANICAL  
SYSTEMS AND SYSTEMS OF OTHER PHYSICAL  
NATURE**

**VERSION 4.3**

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# 1. The pneumatic analogues

## 1.1. TRP - conduit is pneumatic

Storage battery, gas-hydraulic without the indication of the method of the separation of environment taking into account state of the gas about the polytropic law

DEGREES OF FREEDOM:

1 1-I am the point of the connection

it is 2nd 2-I am the point of the connection

Field of application: pneumatics

Parameters:

1 inside diameter, m ( $D > 0$ )

it is 2nd the length of conduit  $> 0$

3- the coefficient of air friction  $> 0$  and  $< 0.05$

4 temperature of the surrounding environment degree,  $C > -20$

## 1.2. CLPOP - Piston pneumatic cylinder of the one-sided action

Piston pneumatic actuator of the one-sided of the action

NAME:       Pneumatic cylinder  
              piston  
              the one-sided action

FIELD OF APPLICATION: pneumatics

DEGREES OF FREEDOM:

- 1 pressure in the cavity
- it is 2nd progressive of the piston
- 3- progressive of the housing

PARAMETERS:

SIGNIFICANT DIMENSIONS

- 1 diameter of piston are external,  $m$  ( $DN > 0$ )
- is 2nd the diameter of piston internal,  $m$  ( $DV \geq 0$ ,  $DV < DN$ )

HELP

CHARACTERISTICS OF THE PACKINGS

- 3- frictional force before the packings in the absence ( $FT0 \geq 0$ )  
pressure before cavities,  $N$
- 4 constant of proportionality of frictional force ( $KF \geq 0$ )  
from pressure in the cavity,  $m ** 2$

HELP

OTHER CHARACTERISTICS OF THE CYLINDER

- is 5th dead space of cavity,  $m ** 3$  ( $VM > 0$ )
- 6 mass of piston,  $kgf$  ( $MP > 0$ )
- 7 mass of housing,  $kgf$  ( $MK > 0$ )
- it is eighth the condition of the presence of the force of gravity ( $NG = 0$  or  $1$ )
- 9 rigidity of supports,  $N/m$  ( $CU > 1e5$  of  $< 1e11$ )

HELP

INITIAL CONDITIONS

- 10 initial distance from the piston to the cover of cavity  $> 0$
- 11- direction of the piston stroke during the supplying of air  $1$  or  $-1$
- 12- temperature of air before the connected conduit ( $> -20$ )
- 13- polytropic exponent of the process ( $> 1$ ,  $< 1.5$ )

ELEMENTS OF STATE VECTOR:

- 1 deformation of the packings

ELEMENTS OF THE WORKING VECTOR:

- 1 area of the cavity
- it is 2nd minimum the preliminary displacement of the packings
- 3- the shear stiffness of packings

### **1.3. DRP - choke is pneumatic**

Choke is pneumatic

NAME: Choke is pneumatic

FIELD OF APPLICATION: Pneumatics

DEGREES OF FREEDOM:

1 1-I am the point of the connection

it is 2nd 2-I am the point of the connection

Field of application: pneumatics

Parameters:

1 the internal diameter, m ( $D > 0$ )

is 2nd coefficient of discharge  $> 0$

3- the temperature of the surrounding environment degree,  $C > -20$

## 1.4. RSVP - capacity is pneumatic

Capacity is pneumatic

NAME: Capacity is pneumatic

Field of application: pneumatics

DEGREES OF FREEDOM:

1 1-I am the point of the connection

it is 2nd 2-I am the point of the connection

Parameters:

1 volume of conduit,  $m^3$  ( $>0$ )

it is 2nd the temperature of the surrounding environment degree,  $C > -20$

## 1.5. RP22 - Distributer is bilinear two-position pneumatic

Distributer is bilinear two-position pneumatic

NAME: Distributer is bilinear two-position  
with the linear law of variation in the passage  
section from the drive signal  
pneumatic

FIELD OF APPLICATION: pneumatics

DEGREES OF FREEDOM:

- 1 pressure at 1 point of the connection
- it is 2nd pressure at 2 points of the connection
- 3- the value of the drive signal

Parameters:

- 1 the internal diameter,  $m$  ( $D > 0$ )
- is 2nd coefficient of discharge  $> 0$
- 3- the temperature of the surrounding environment degree,  $C > -20$

## 1.6. RP32 - Distributer is trilinear two-position pneumatic

Distributer is trilinear two-position pneumatic

NAME: Distributer is trilinear two-position  
with the linear law of variation in the passage  
section from the drive signal  
pneumatic

FIELD OF APPLICATION: pneumatics

DEGREES OF FREEDOM:

- 1 pressure at 1 point of connection (entrance)
- it is 2nd pressure at 2 points of connection (output 1)
- 3- pressure at 3 points of connection (output 2)
- 4 value 1 the drive signals

Parameters:

- 1 the internal diameter, m ( $D > 0$ )
- is 2nd coefficient of discharge  $> 0$
- 3- the temperature of the surrounding environment degree,  $C > -20$



## **1.7. KPP - Valve is protective pneumatic**

Valve is protective pneumatic

NAME: Valve is protective pneumatic  
with the static expense  
by the characteristic

Field of application: pneumatics

DEGREES OF FREEDOM:

- 1 pressure against the entrance
- it is 2nd pressure against the output

Parameters:

- 1 the internal diameter, m ( $D > 0$ )
- it is 2nd the pressure of adjustment, MPa  $> 0$
- 3- coefficient of discharge  $> 0$
- 4 temperature of the surrounding environment degree, C  $> -20$

## 1.8. KOP - Valve is reverse pneumatic

Valve is reverse pneumatic

NAME: Valve is reverse pneumatic  
with the static expense  
by the characteristic

Field of application: pneumatics

DEGREES OF FREEDOM:

- 1 pressure against the entrance
- it is 2nd pressure against the output

Parameters:

- 1 the internal diameter, m ( $D > 0$ )
- is 2nd coefficient of discharge  $> 0$
- 3- the temperature of the surrounding environment degree,  $C > -20$