I Application

The NLR valve is a proportional pneumatically actuated valve designed for flow control in installations of the pharmaceutical industries.
It is widely used to control the pressure of a water loop with a pressure transmitter (PID) when the loop is controlled by neither a flowmeter nor a frequency converter of the pump.

I Operating principle

The position sensor instantly controls the operating position to keep the valve in the position determined by the user (PD function) or by a process parameter (PID function). The operation position can be programmed by:

- a standard input signal sent by en external element (e.g. a sensor).

- an internal controller integrated into the positioner. The signal is sent form a keyboard.

I Diseño y características

Normally closed valve (standard version).
Equal percentage regulation shaft.
360º adjustable body.
Compact design.
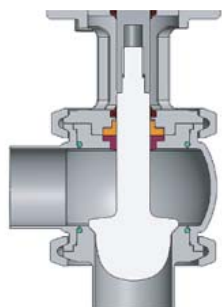Dual function positioner:
      -PD: position controller
      -PID: process controller
Easy assembly/disassembly by loosening the clamp.
Standard connections: Clamp OD.
Traceability of components.

Equal percentage regulation shaft

I Materials

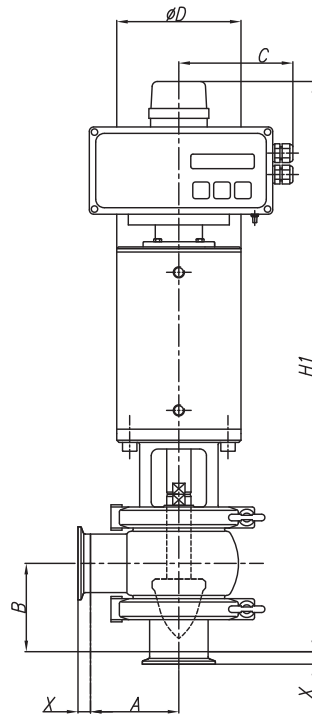| Parts in contact with the product	AISI 316L
Other stainless steel parts	AISI 304
Gaskets	EPDM according to FDA 177.2600
Internal surface finish	Ra ≤ 0,5 μm
External surface finish	bright polish

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I Options

Steam barrier (if shaft sterilisation is required).
Jacketed body.
Larger actuator sizes.
Gaskets: NBR or FPM.
Connections: weld.
Material and surface roughness certificates.

I Technical specifications

Available sizes	*DN 1" - DN 4"*	
Working temperature	*-10 ºC to +121 ºC (EPDM)*	*14 ºF to 250 ºF*
	+140 ºC (SIP, max. 30 min)	*284 ºF*
Max.working pressure	*10 bar*	*145 PSI*
Compressed air pressure	*6-8 bar*	*87-116 PSI*
Air supply connections	*G1/8" (BSP)*	
Voltage	*24 V DC*	
Signal	*4...20 mA*	
	0...10 V (optional)	

DN	A	B	C	D	H1	X
DN-1"	50	55		86	425	
DN-1 ½"	60	65		86	440	
DN-2"	70	80	105	112	500	13
DN-2 ½"	80	90		145	610	
DN-3"	90	100		145	625	
DN-4"	125	120		168	690	16

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NLR pharmaceutical

I Dimensioning

In the case of the pressure regulation, it is necessary to indicate the range of the pressure to regulate (inlet/outlet pressure) and the valve inlet flow.
In the case of the flow regulation, it is necessary to indicate the flow range to regulate (valve outlet) and the valve inlet pressure.

The NLR is an equal percentage flow characteristic valve.

Khe Kv factor is usually used to calculate the dimensions of this kind of valves, the factor allow us to relate the pressure drop and the flow.

The Kv factor is defined as the flow of water through a valve in cubic meters per hour with a pressure drop of 1 bar (see table below).

VALVE DIAMETER	Kv (m³/h) 100% opening	Kv (m³/h) 50% opening
DN-25	13	6
DN-40	31	15
DN-50	59	20
DN-65	87	33
DN-80	140	48
DN-100	178	59
DN-1"	9	4
DN-1 ½"	24	10
DN-2"	48	19
DN-2 ½"	71	26
DN-3"	106	39

The Kv is calculated for water at 5-30ºC.

The required Kv (Kv_R) for products with low viscosity and density can be calculated by means of this formula:
$Kv_R = Q/\sqrt{\Delta P}$ (for viscous products, consult the technical department).

$\qquad$ Q (required flow in m³/h)
$\qquad$ ΔP (pressure drop in bar: inlet pressure minus outlet pressure)

The selected Kv (Kv_S) index must be higher than the required Kv_R to ensure a sifficient margin for control.
Thus, a safety factor is applied by means of the formula: $Kv_S = Kv_R / 0,7$.

Example:

$Q= 15$ m³/h $\Delta P = 1$ bar
$Kv_R = Q/\sqrt{\Delta P} = 15$
$Kv_S = Kv_R / 0,7 = 21,43$ $\longrightarrow$

> According to the result, the most adequate valve is the DN 40 with the maimum index of 31 m³/h (Kv at 100% opening).
> In inches, the most adequate valve is the DN 1 ½".

For calculation in other units: Cv = 1.16 x Kv (gallon/minute and psi)

NB: Remember that the NLR valve is not a shut-off valve and its code includes neither positioner nor potentiometer.

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