

## Proportional Controller Types P3P and P3N

### Application

For *stepless (infinitely variable) capacity control of air compressors:*

Both proportional controller types P3P and P3N are designed to govern capacity control devices of compressors, speed control devices of engines, bleed valves, and bypass valves.

*Other applications:*

Proportional controller type P3P 3E and P3P 5E can also be used as a relief valve or a signal pressure limiter.

**⚠ Attention! Never attempt to disassemble a cylinder whilst under pressure!**

### Portable screw compressor with P3P

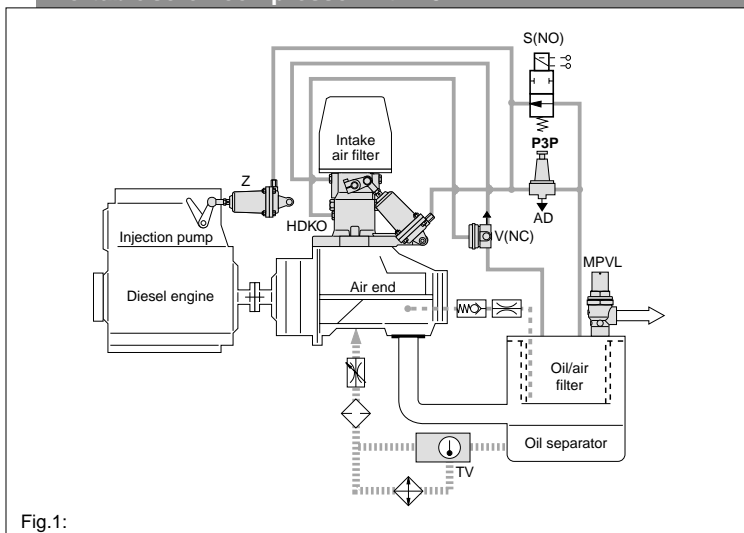


Fig.1:

### Stationary screw compressor with P3N

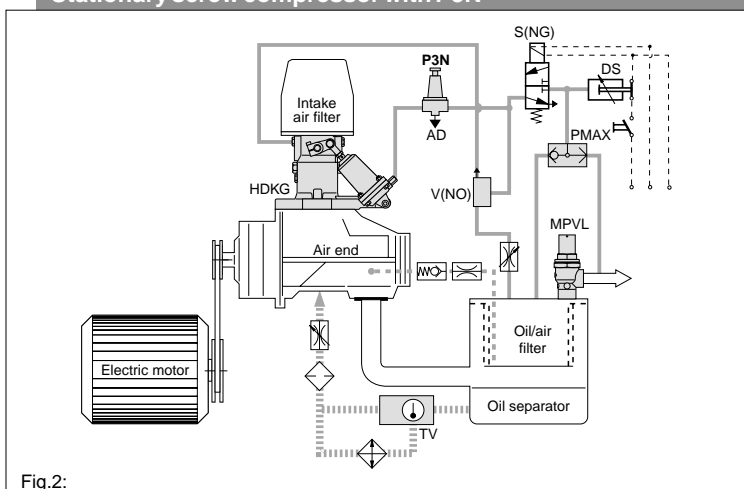


Fig.2:



### Installation

The types P3PE and P3NE have connections with European standard thread. Types P3PF and P3NF are flanged on valve housing or distributor plates.

Inlet E is connected to the discharge pressure line of the compressor or to an air receiver via a signal pressure line. The pressure line is also the air supply line of the controller and has to be dimensioned accordingly (see *Details*).

Outlet A is connected to the signal pressure line for governing suction control valves, bleed valves, venting valves, servo cylinders, and other control devices.

Outlet nozzle (AD): Air consumed by control devices is vented via the outlet nozzle. Proportional controllers with outlet nozzle in the housing are available. If a proportional controller without outlet nozzle in the housing is used, an outlet nozzle has to be installed in a T-fitting located in the signal pressure line.

### Ordering details:

1. *Type and article no.:*

It is necessary to state both type and article no.

The second digit of the article no. is the number of the controller spring (8). Article numbers of controller executions with outlet nozzle (AD) in the housing have two hyphens. The diameter of the outlet nozzle is indicated by the number after the second hyphen.

*Ordering example for P3N E with control spring no. 5 and outlet nozzle diameter 1.50 mm: P3N E, 25-557882-150*

2. *Ordering by specifying data:*

- Desired set point (e. g. discharge pressure at full load),
- Desired proportional band (control band) at signal pressure range,
- Quantity of air to be blown off at idling (P3P types)
- Servo pressure/air quantity to govern control components.
- With or without bracket.

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**R216E**

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## Details

Controller type		P3P 1E	P3P 3E	P3P 5E	P3P 3F	P3N E	P3N F
Installation dimensions		Fig.3	Fig.3	Fig.3	Fig.5	Fig.4	Fig.5
Controller nozzle; DN	mm	1	3	5	3	3	3
Max. working pressure PS	bar (g)	28	28	16	16	28	16
Operating pressure	bar (g)	2 to 25	2 to 25	2 to 15	2 to 15	2 to 25	2 to 15
Minimum inner diameter of air supply line (E)	mm	4	5	7	5	5	5
Operating mode (control signal)		positive (direct) diagram 1				negative (inverse) diagram 2	
Pressure range of control spring	bar (g)	spring 2: 2 to 7 • spring 5: 5 to 15 • spring 8: 8 to 25					
Temperature range	°C	operating temperature: 20 to +70 at start-up: from -20 at emergency stop: up to +100					
Medium		oily pressurized air, filtered • recommended compressed air quality according to DIN ISO 8573-1, class 5 Reference oil: see <a href="http://www.hoerbigerkompresortechnik.de">www.hoerbigerkompresortechnik.de</a>					
Proportional band <sup>1)</sup> (control band)	%	3 to 20 of pressure at inlet E, depending on operating pressure, controller nozzle and outlet nozzle (AD)					
Reproducibility of signal pressure at outlet A	%	±1 to ±2 of the maximum pressure at inlet E, depending on proportional range					
Hysteresis	%	±1 to ±2 of the maximum pressure at inlet E, depending on proportional range					
Air consumption	Nl/min	depends on the control pressure at outlet A and the diameter of the outlet nozzle (AD)					
Installation attitude		optional					
Materials		aluminium alloy, brass, corrosion resistant steel plated steel, perbunane					
Weight	kg	design E: 0.32		flange design F: 0.24			

<sup>1)</sup> Selection of proportional band depends on compressor data

## Flanged execution P3P F, P3N F

Pictured: Typ P3N F  
(Installation dimensions of type P3P 3F are identical)

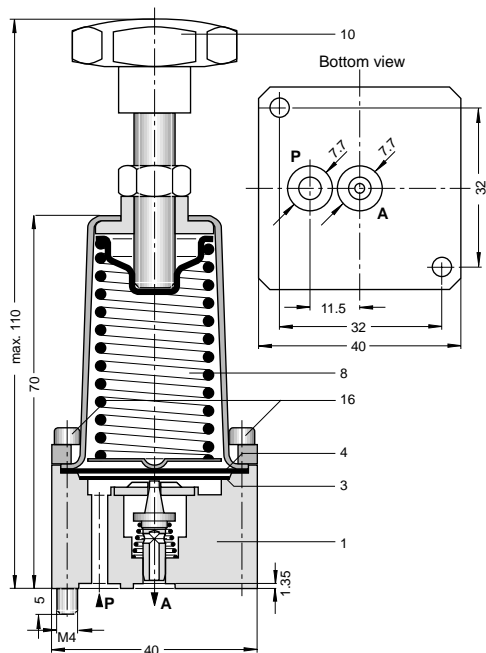


Fig.5

## Control signal of P3P E

(positive acting controllers)

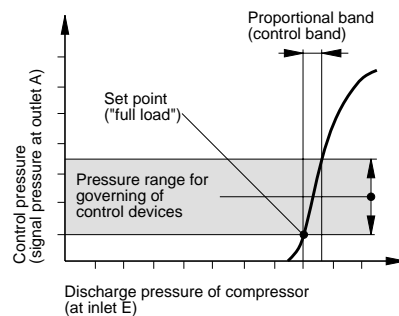


Diagram 1

## Control signal of P3N E

(negative acting controllers)

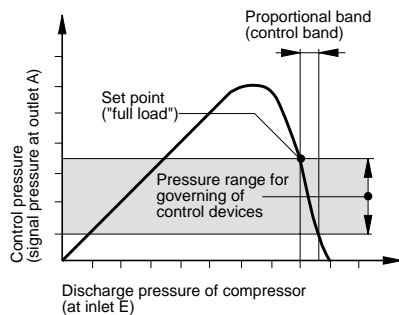


Diagram 2

## Operation

### Types P3P and P3N applied as proportional controllers:

The pressure at inlet E is transformed directly to an analogue pneumatic signal at outlet A. Within the control band of the controller this signal is proportional to an increasing or decreasing pressure at inlet E.

Types P3P give a rising control signal at A on increasing pressure at E (positive acting or direct acting - see diagram 1).

Types P3N give a rising control signal at A on decreasing pressure at E (negative acting or inverse acting - see diagram 2).

### Types P3P applied as small relief valve or signal pressure limiter:

The controller nozzle opens steplessly, if the pressure at inlet E exceeds the set point. The amount of air vented via the outlet A is proportional to the increasing pressure at inlet E.

### Types P3P applied as proportional controller plus bleed valve:

Some executions of direct acting controllers may be used for both stepless capacity control and zero load bypass on small or medium sized compressors.

## Adjustment

### Set point:

The set point, i. e. the desired pressure at which the control system starts acting, is adjusted by turning the screw (10). The controller is adjusted during the commissioning period of the compressor:

- The set point is increased to a higher pressure, when the screw (10) is turned to the right (clock-wise).
- The set point is decreased to a lower pressure, when the screw (10) is turned to the left (counter-clockwise).
- The direction of turning the screw (10) should be maintained when the set point is adjusted.

### Proportional band (control band):

The inlet pressure range at E from the set point ("full load") to the termination point of the control system ("idling") is defined by several items of the controller. Modifications of the proportional band are usually achieved by changing the outlet nozzle (AD):

The proportional band is increased by installing an outlet nozzle with a larger diameter.

The proportional band is decreased by installing an outlet nozzle with a smaller diameter.

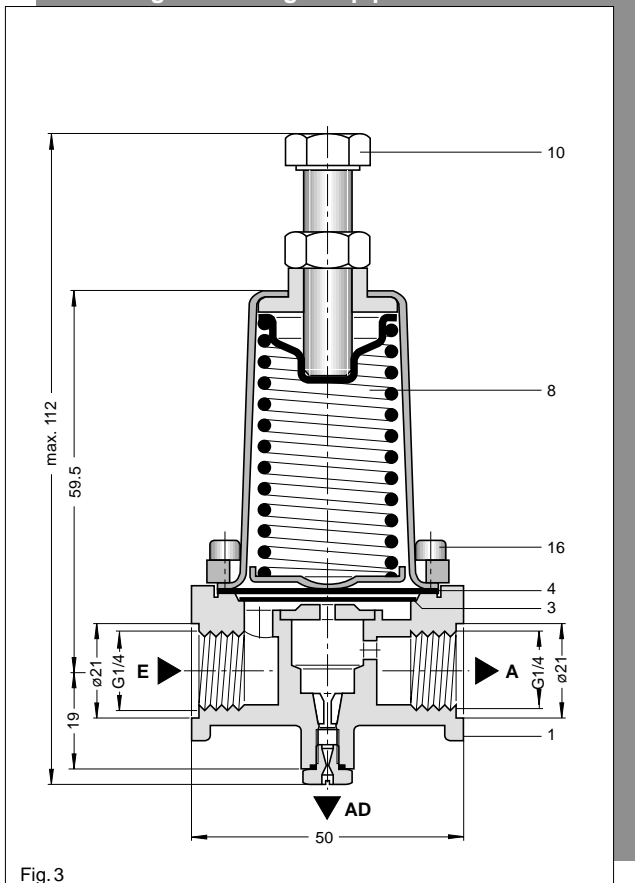
The set point is to be readjusted when the outlet nozzle has been exchanged.

Some executions of proportional controllers are equipped with an outlet nozzle (not pictured). The outlet nozzle (AD) has to be installed externally as shown in Fig. 1, if a proportional controller without built-in outlet nozzle is used.

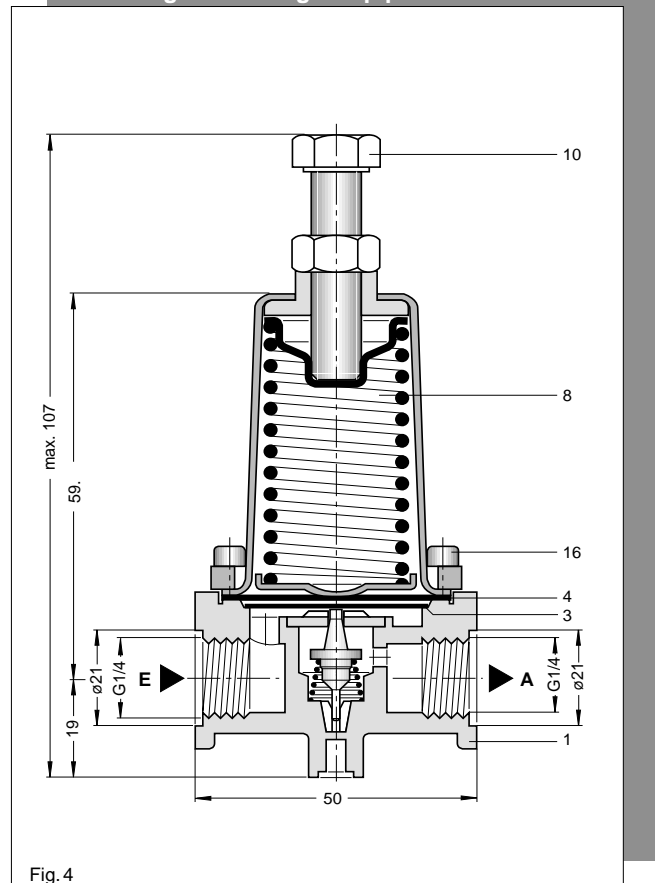
## Maintenance

The service manual W216RCC contains information regarding the maintenance intervals. While disassembling the valve for inspection, cleaning or retrofitting purposes, also refer to the respective information contained in the service manual W216RCC. For the actual service manuals visit our homepage [www.hoerbigerkompresorteknik.de](http://www.hoerbigerkompresorteknik.de).

P3P E Regulator design for pipe connections



P3N E Regulator design for pipe connections



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