

Electropneumatic Position Controller EPR 02



For rotary and linear drives
Microprocessor-controlled
NAMUR interface

Catalog Register
A 16, P 16

Publication 7503201.06.08.97

**OBSOLETE
DOCUMENT**
Technical
Reference
Only

Description

General

This electropneumatic controller provides pneumatic actuation and position-control functions for rotary and linear drives.

Operation

The position of the drive in question is controlled in accordance with a setpoint signal (reference variable w). The microprocessor-controlled electronic control unit compares this signal with the signal (actual value x) from an angle sensor within the controller. In accordance with the result of this comparison, the electronic control unit activates the switching valves within the controller, which in turn controls the position of the drive. There is thus a linear relationship between the drive position and the setpoint signal. If a fast rate of change is required with large drives, the drive in question can be fitted with a 5/3 booster valve to assist the action of the controller switching valves.

Application

- Positioning of pneumatically-controlled drives for actuators used with butterfly, ball and servo valves.

Further available designs (on request)

- Controller with switching valves of small nominal size for very small drives
- Electropneumatic 3-position controller with external actual-value feedback (see our Publication 7503228).




Features

- No air consumption after controller has settled
- Suitable for single- and double-acting drives
- Easy to install and commission
- Reproducible adjustment of operating parameters via switches
- Controller brings drive into a defined safety position in the case of a power failure
- Current or voltage signal as setpoint
- Electrical position feedback signal (actual value)
- Electrical "ready" signal
- Reversal of direction
- Variable end-position shut-off
- Angle of rotation up to 300°
- Angle of rotation limitation
- Variable split-range operation

Parameters

General parameters

Designation	Electropneumatic controller
Symbol	
Port size	G 1/4
Mounting position	Optional
Ambient temperature [°C]	-10 ... +60
Storage temperature [°C]	-10 ... +80
Weight [kg]	1.8
Degree of protection	IP 65

Pneumatic parameters

Fluid	Filtered, lubricated or unlubricated air
Flow max. [l/min]	27 ¹⁾
Fluid temperature [°C]	-10 ... +40
Operating pressure [bar]	0 ... 10
Filtration [µm]	70

Electrical parameters

Supply

Supply voltage U_B [V]	22 ... 28 VDC
Residual ripple max. [%]	10
Current draw I_{max}	
Electronic part [mA]	100
Valves [mA]	320

Setpoint input¹⁾

Voltage signal U_E [V]	0 ... 10
Input resistance R_i [kΩ]	>470
Current signal I_E [mA]	0 (4) ... 20
Load R_i [Ω]	100

Split-range with 10 % span referred to final value

Actual value output¹⁾

Voltage signal U_E [V]	0 ... 10
Output current max. [mA]	2
Current signal I_A [mA]	0 (4) ... 20
Permissible load [Ω]	0 ... 400

Operation condition

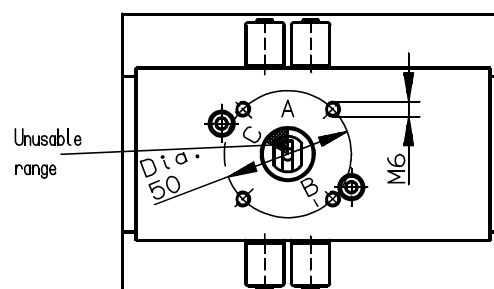
Voltage signal [V]	$U_B^{3)}$ -1.4
Output current max. [mA]	5

Drive of booster valve

Output voltage [V]	$U_B^{3)}$ -1.4
Output current ²⁾ max.	
Solenoid A [mA]	400
Solenoid B [mA]	400
Duty cycle [%]	100

Adjustable parameters (for description, see Page 5)

Control span	A→C	A→B
Angle of rotation min.	20°	10°
max.	300°	150°
Position tolerance – incrementation	0.5 ... 3.5° 0.5°	0.25 ... 1.75° 0.25°
Disconnection at final position (on both sides) – incrementation	0 ... 10.8° 1.8°	0 ... 5.4° 0.9°
Limitation of angle of rotation – incrementation	20 ... 300° 0.25°	10 ... 150° 0.25°
Gain – incrementation	0.25 ... 4.0° 0.25°	0.25 ... 4.0° 0.25°
Booster valve threshold – incrementation	100 ... 40% 10 %	

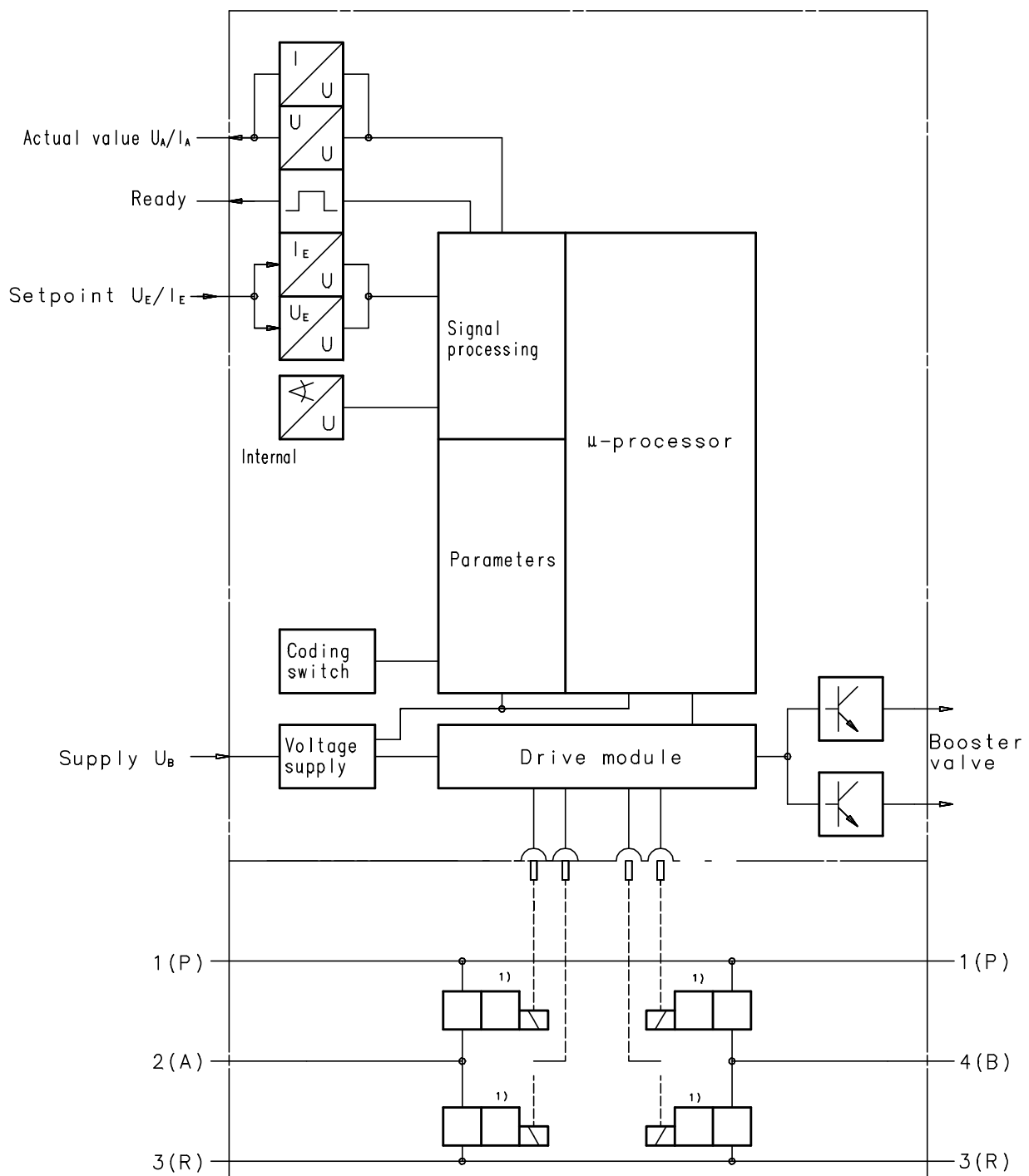


¹⁾ at 6 bar operating pressure and $\Delta p = 1$ bar

²⁾ Short-circuit proof

³⁾ U_B = Operating voltage

Block diagram



¹⁾ Valve logic corresponding to function of drive in case of power failure

Equipment list (standard units)

Valve logic		Actuator		Cat. No.
Connection 2	Connection 4	Double-acting	Single-acting	
Exhausted	Exhausted	Pressureless	Pressureless	5988084
Pressurized	Exhausted	End position 4	—	5988085
Exhausted	Pressurized	End position 2	—	5988086
Closed	Closed	Clamped	Clamped	5988087
Pressurized	Pressurized	Pressurized	Pressurized	5988088

Accessories

Designation	Description	Cat. No.
Air treatment Filter cartridge for thread G 1/4 and 1/4-18 NPT		0681173
Booster valve, complete, consisting of: 5/3 directional control valve, port G 1/4, flanged, — solenoid pilot operated, operating pressure 3 to 10 bar, k_v value = 0.9 ($C_v(US) \approx k_v \times 1.2$)		2636447.0247 24 VDC
Subplate, complete, port G 1/4, flanged, with mounting bolts, O-rings, coding stud and washer		0540109
Add-on set for linear drives to IEC-534-6 (NAMUR)	Page 7	0728931
Add-on set for rotary drives to IEC 534 Size I Size II Size III Size IV	Page 9	0681251 0681252 0681253 0681254

Spare parts

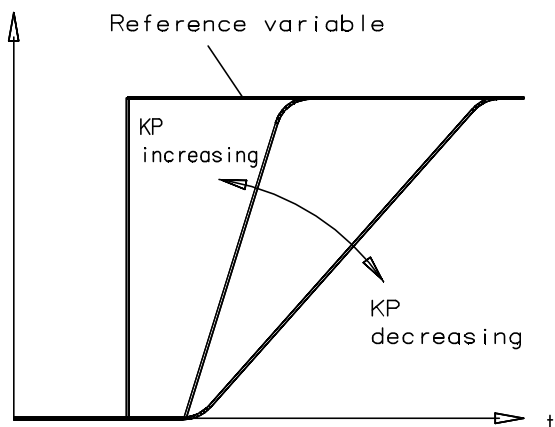
Designation	Cat. No.
3/2 directional control valve, with seal (24 VDC)	8010201.9000 24 VDC
Connector X1 (8-pin) Connector X2 (6-pin)	0799009 0799010

Adjustment facilities

The following parameters and functions can be adjusted by means of switches in the controller

Controller gain [Kp]

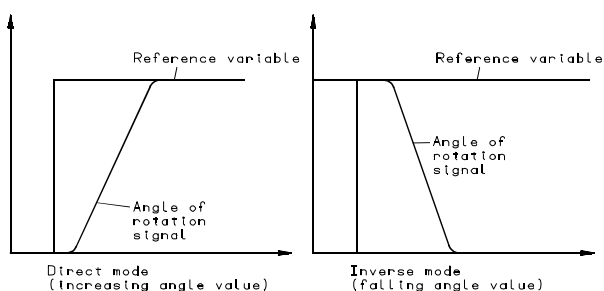
This determines the settling characteristics of the drive. The bigger the drive, the higher the gain should be!



Reversal of direction

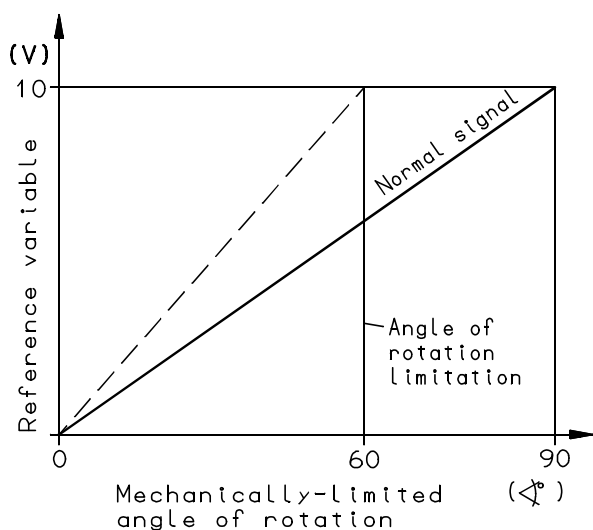
Using the same setpoint, the drive can be operated in either of the following two modes:

- Direct: Drive position directly proportional to setpoint
- Inverse: Drive position inversely proportional to setpoint



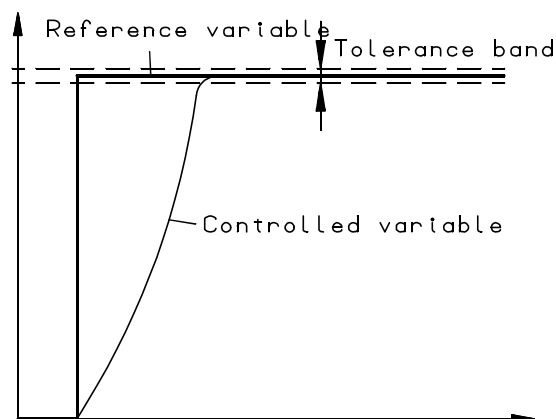
Angle of rotation limitation

Allows the angle of rotation or stroke to be limited to less than the value governed by the mechanical stop.



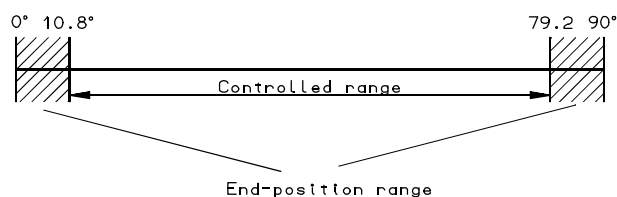
Tolerance band

This is the bandwidth within which the actual position can deviate from the setpoint position without triggering a correction. The smaller the tolerance band is adjusted, the better the position can be maintained. The air consumption rises in consequence of frequent corrections.



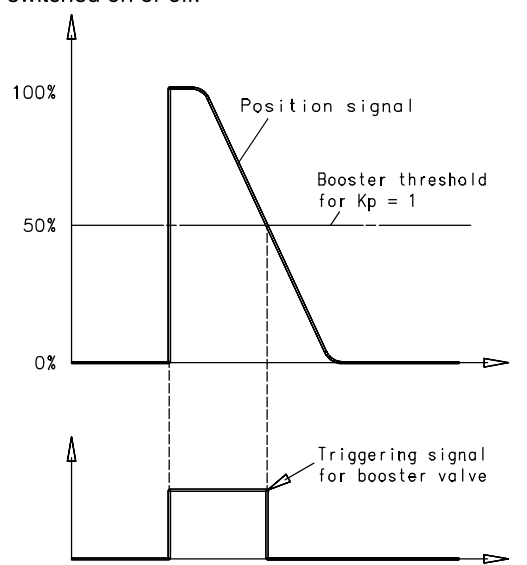
End position shut-off

Allows the drive to be run at maximum force and speed into the "closed" and "open" end positions.

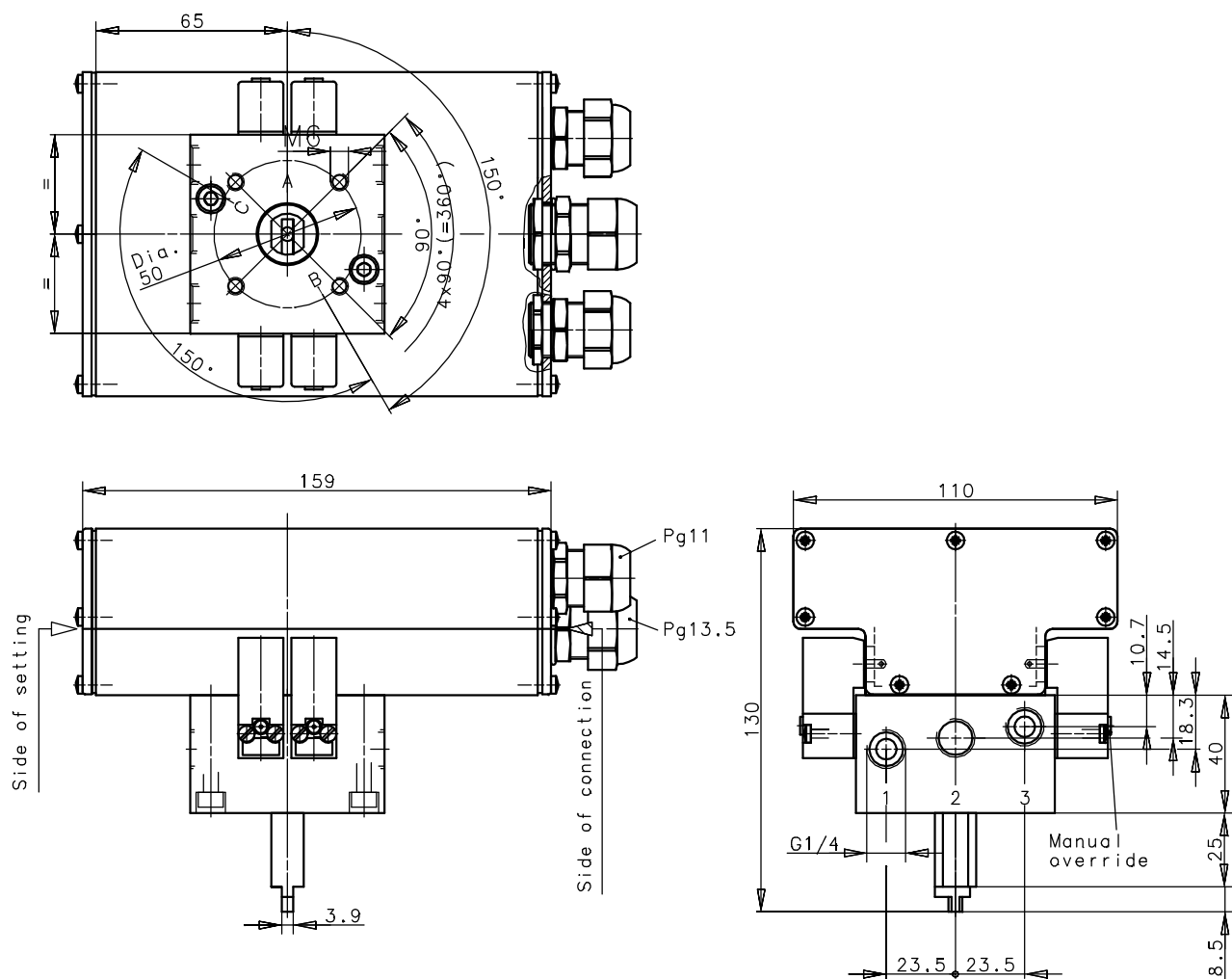


Booster valve control

This valve boosts the flow rate of the switching valves within the controller, allowing fast rates of change even with large drives. There is facility for adjustment of the magnitude of deviation which causes the booster valve to be switched on or off.



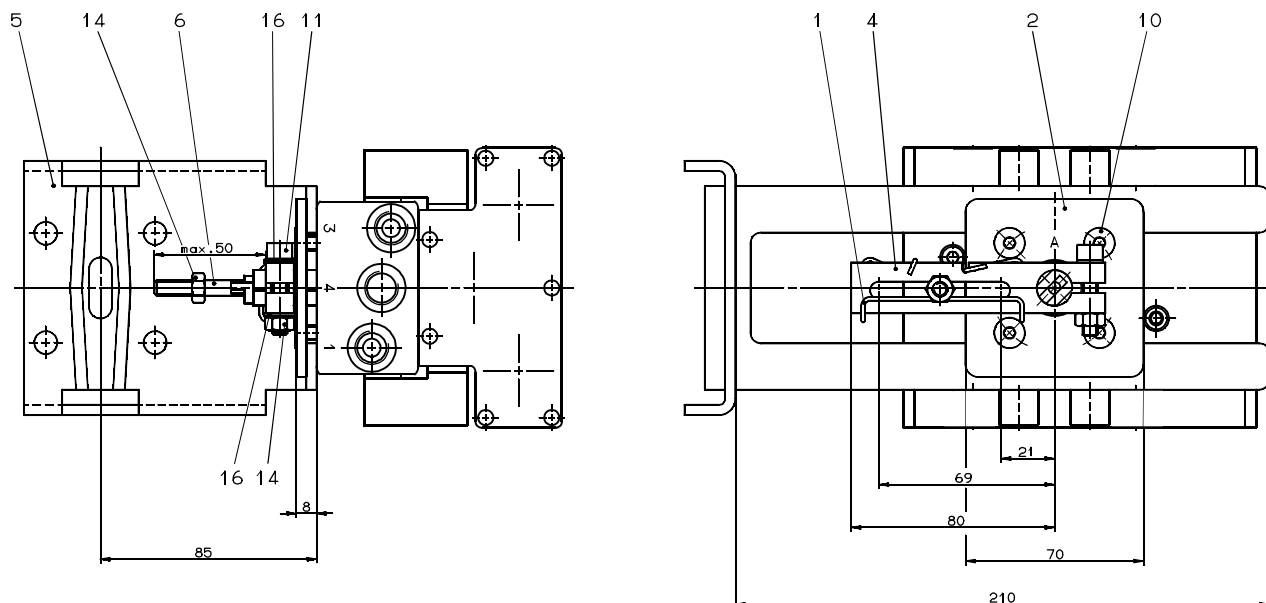
Dimensional drawing [mm]



Add-on unit for cylinders according to IEC 534-6 (NAMUR)

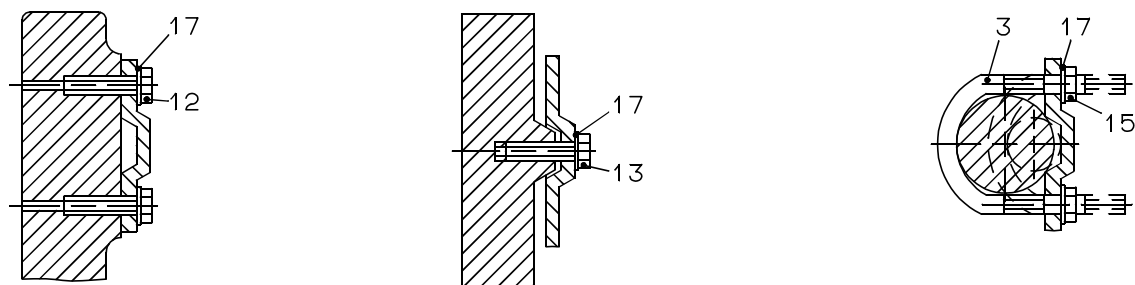
The modular unit is required when using a position controller for linear movements of final control elements according to DIN IEC 534-6.

Dimensional drawing [mm]



- 1 Bracket
- 2 Plate
- 3 Bracket
- 4 Lever
- 5 Angle
- 6 Threaded pin
- 10 Countersunk screw
- 11 Socket-head screw
- 12 Socket-head screw
- 13 Hexagon cap screw
- 14 Hexagonal nut
- 15 Hexagonal nut
- 16 Disc
- 17 Spring washer

Possibilities of attachment on cylinder



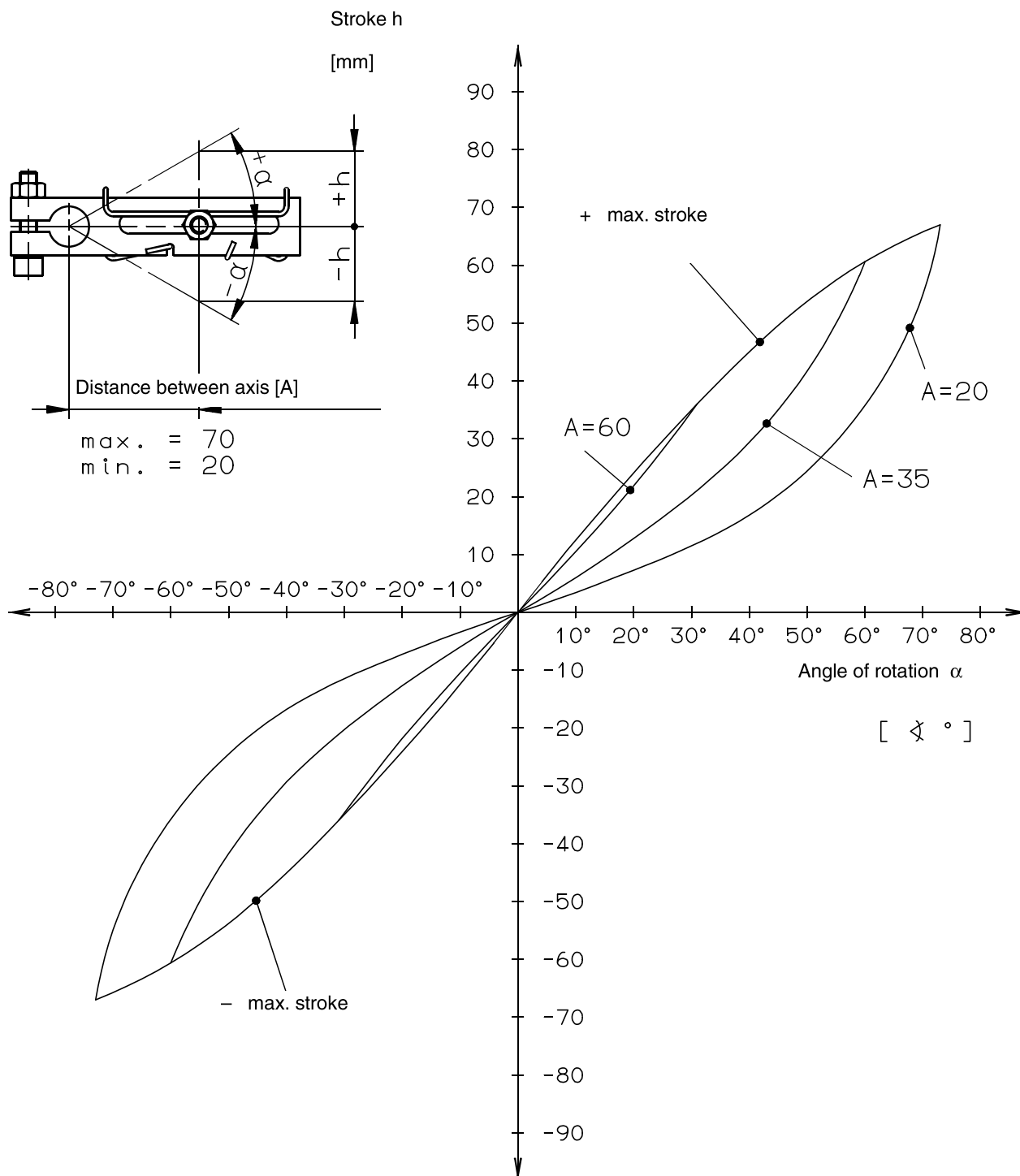
Attachment of mounting plate
on an even surface

Attachment of mounting plate
on a rib

Attachment of mounting plate
on a column, dia. 20 to 35 mm

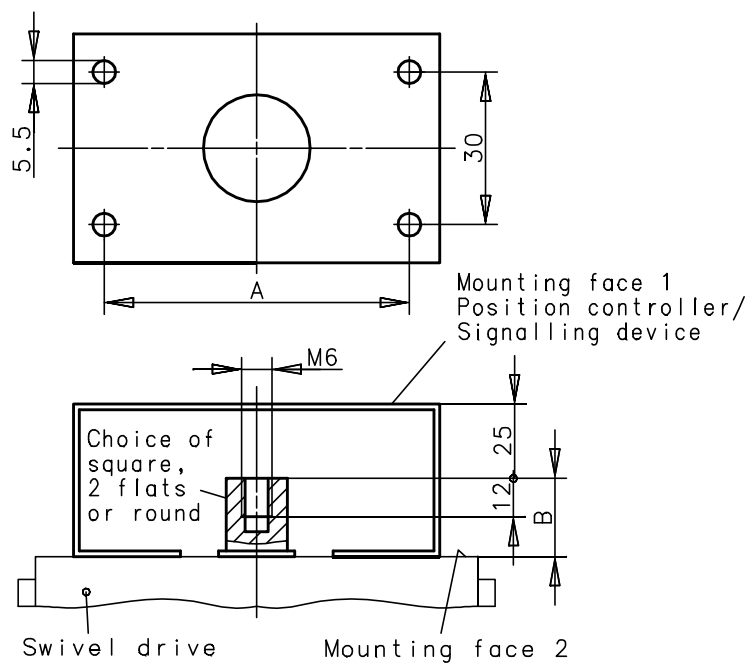
Add-on unit for cylinders according to IEC 534-6 (NAMUR)

Limits of application and dynamic behaviour at different distances



Add-on unit for swivel drives according to IEC 534

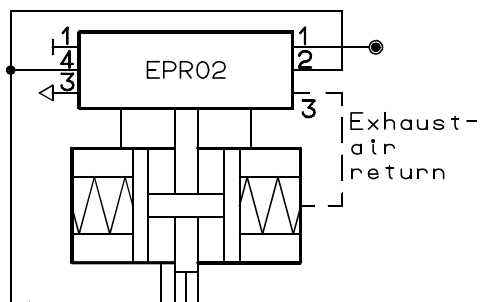
Dimensional drawing [mm]



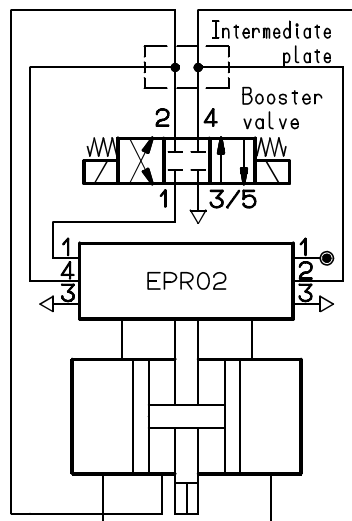
Dimensional table [mm]

Size	A	B
I	80	20
II	80	30
III	130	30
IV	130	50

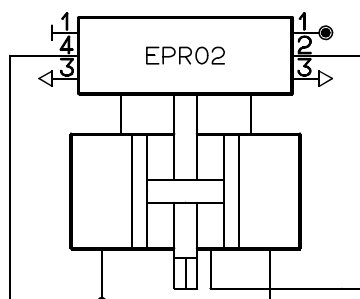
Applications



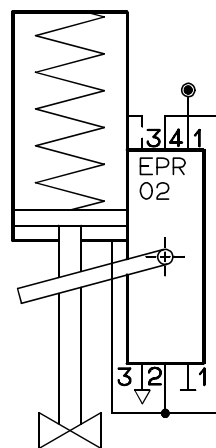
Rotary actuators, single-acting



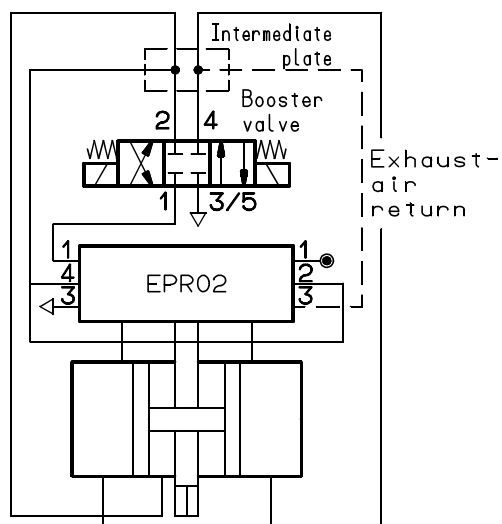
Rotary actuator, double-acting, with booster valve



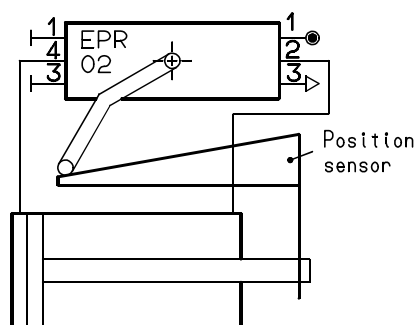
Rotary actuators, double-acting



Linear actuator, single-acting¹⁾



Rotary actuators, single-acting, with booster valve



Positioning of double-acting cylinder¹⁾

¹⁾ The circuits used for rotary actuators can also be applied for linear actuators