PositionMaster EDP300
Electro-Pneumatic Positioner

Compact, well-proven, and flexible

High air capacity
Diagnostics capability
Resistant to overpressure
Robust and environmentally ruggedized
Easy to commission

Approvals for explosion protection
— ATEX
— IECEx
— FM / CSA
— GOST

For SIL2 safety loop
Advanced diagnostics
PositionMaster EDP300
Electro-Pneumatic Positioner

Brief description

The PositionMaster EDP300 is an electronically configurable positioner with communication capabilities designed for mounting to pneumatic linear or part-turn actuators. It features a small and compact design, a modular construction, and an excellent cost-performance ratio. Fully automatic determination of the control parameters and adaptation to the final control element yield considerable time savings and an optimal control behavior.

Pneumatics

An I/P module with subsequent pneumatic amplifier is used to control the pneumatic actuator. The well-proven I/P module proportionally converts the permanent electrical setpoint signal from the CPU into a pneumatic signal used to adjust a 3/3-way valve. The air flow for pressurizing or depressurizing the actuator is continuously adjusted. As a result, excellent control is achieved. When reaching the setpoint, the 3/3-way valve is closed in center position to minimize the air consumption. Four different pneumatics versions are available: for single-acting or double-acting actuators, each with “fail-safe” or “fail-freeze” function.

“Fail-safe” function
If the electrical supply power fails, the positioner output 1 is depressurized, and the pneumatic actuator's return spring moves the valve to the defined safe position. In case of a double-acting actuator the second output 2 is additionally pressurized.

“Fail-freeze” function
If the electrical supply power fails, the positioner output 1 (and 2, if applicable) is closed and the pneumatic actuator stops ("freezes") the valve in the current position. If the compressed air supply power fails, the positioner depressurizes the actuator.

Operation

The positioner has a built-in LCD-indicator with a multi-line LCD display and 4 pushbuttons for commissioning, configuration, and monitoring during live operation. Alternatively, the appropriate DTM/EDD can be used via the available communication interface.

Communication

The positioner supports HART5 and HART7 communication.

Inputs/Outputs

In addition to its input for the analog position setpoint, the positioner is equipped with a digital input which can be used to activate control system functions in the device. A digital output allows you to output collective alarms or fault messages.

Modular design

The basic model can be enhanced at any time by retrofitting optional equipment. Option modules for analog and digital feedback, an emergency shutdown module, and pressure sensors for valve diagnostics can be installed. A module for a universal analog input can also be installed to which any device supplying a 4 ... 20 mA signal can be connected. Additionally, a mechanical position indicator, proximity switches or 24 V microswitches are available for indicating the position independently of the mother board function.

Diagnostics

The positioner has three optional pressure sensors which can be used for reliable diagnostics of the valve, the pneumatic drive, and the positioner.
Fig. 1: Schematic diagram of the positioner
A Electronic  |  B Pneumatic  |  C Position sensor  
1 4 ... 20 mA/bus connection  | 2 Digital input  | 3 Alarm output  | 4 Supply air  | 5 Output 1  | 6 Output 2  
7 Analog feedback  | 8 Digital feedback  | 9 Shutdown module  | 10 Universal input  | 11 Pressure sensor  
12 Mechanical end position switch 24 V microswitch  | 13 Proximity switches (NO)  | 14 Proximity switches (NO)  
15 Optical position indicator

Important (Note)
With optional upgrades either the “mechanical feedback with proximity switches” (13 or 14) or the “mechanical feedback with microswitch 24 V” (12) can be used.
Only two different plug-in modules can ever be used.
Mounting versions

To linear actuators in accordance with the standard
Lateral attachment is in accordance with DIN / IEC 534 (lateral attachment to NAMUR). The required attachment kit is a complete set of attachment material, but does not include the screwed pipe connections and air pipes.

Integral mounting to control valves
The positioner featuring standard pneumatic action is available as an option for integral mounting. The required holes are found at the back of the device. The benefit of this design is that the point for mechanical stroke measurement is protected and that the positioner and actuator are linked internally. No external tubing is required.

To rotary actuators in accordance with the standard
This attachment is designed for mounting according to the standard VDI/VDE 3845. The attachment kit consists of a console with mounting screws for mounting on a rotary actuator. The adapter for coupling the positioner feedback shaft to the actuator shaft has to be ordered separately. Screwed pipe connections and air pipes have to be provided on site.

Special actuator-specific mounting
In addition to the mounting methods described above, there are special actuator-specific attachments.
Device parameters

General remarks
Microprocessor-based position control in the positioner optimizes control. The positioner features high-precision control functions and high operational reliability. Due to their elaborate structure and easy accessibility, the device parameters can be quickly adapted to the respective application.

The total range of parameters includes:
— Operating parameters
— Adjustment parameters
— Monitoring parameters
— Diagnostics parameters
— Maintenance parameters

Operating parameters
The following operating parameters can be set manually if required:

Setpoint signal
0 ... 100 % freely selectable for split-range operation
For 4 ... 20 mA and HART version:
— Signal min. 4 mA, max. signal 20 mA (0 ... 100 %)
— Min. range 20 % (3.2 mA)
— Recommended range > 50 % (8.0 mA)

Action (setpoint signal)
Increasing:
Position value 0 ... 100 % = direction 0 ... 100 %
Decreasing:
Setpoint signal 100 ... 0 % = direction 0 ... 100 %

Characteristic curve (travel = f(setpoint signal))
Linear, equal percentage 1:25 or 1:50 or 25:1 or 50:1 or freely configurable with 20 reference points.

Travel limit
The positioning travel, i.e. the stroke or angle of rotation, can be reduced as required within the full range of 0 ... 100 %, provided that a minimum value of 20% is observed.

Shut-off function
This parameter can be set separately for each end position. When the respective configured limit value is exceeded, the shut-off function causes immediate travel of the actuator until reaching the set end position. When the shut-off value is set to “0”, the position is further controlled, even in the respective end position.

Travel time prolongation
This function can be used to increase the max. travel time for full travel. This time parameter can be set separately for each direction.

Switching points for the position
You can use these parameters to define two position limits for signaling (see option “Module for digital position feedback”).

Alarm output
The alarms generated in the positioner can be polled via the digital output as a collective alarm. The desired information can be selected via the LCD display or remotely via the configuration program. The output can be set to “active high” or “active low”, as required.

Digital input
For the digital input, one of the following safety options can be selected. You may use the LCD display or configuration program to select an option.
— No function (default)
— Move to position substitute value (freely selectable)
— Start "Partial Stroke Test"
— Ventilate output 1, evacuate output 2
— Ventilate output 2, evacuate output 1
— Service required
— Move to 0 % position
— Move to 100 % position
— Hold previous position
— Disable local configuration
— Disable local configuration and operation
— Disable all access (no local or remote access via a PC)
The selected function is activated once the 24 V DC signal is no longer applied (< 11 V DC).
**Adjustment parameters**

The positioner has a special function for automatic adjustment of the parameters. Additionally, the control parameters can be set automatically (in adaptive control mode) or manually to optimally adapt them to the process requirements.

**Zone**

Upon reaching this value, the position is readjusted more slowly until the dead band is reached.

**Dead band (sensitivity)**

When reaching the dead band, the position is held.

**Display 0 ... 100 %**

Adjusting the display (0 ... 100 %) according to the direction of action for opening or closing the actuator.

**Diagnostics**

Various functions for permanent operational monitoring are implemented in the PositionMaster EDP300 operating program. The following states will be detected and indicated, e.g.:
- Setpoint signal out of range 0 ... 100 % or 4 ... 20 mA
- Position out of the adjusted range
- Positioning time-out (adjustable time parameter)
- Position controller inactive
- Counter limit values exceeded (can be set via DTM/EDD)

**LCD display**

The LCD indicator has a cover to protect against unauthorized operation.

Commissioning the positioner is especially easy. Autoadjust is triggered by pressing just a few pushbuttons. Detailed configuration knowledge is not necessary in order to start the device.

Depending on the selected actuator type (linear or rotary), the displayed zero position is automatically adapted.

Besides this standard function, a customized “Autoadjust” function is available. The function is launched either via the LCD display or HART communication.

The built-in LCD indicator with four pushbuttons supports the following functions:
- Operational monitoring
- Manual intervention during live operation
- Device configuration
- Fully automatic commissioning
- Display of diagnostic messages

A menu-controlled configuration is available via the pushbuttons on the device.
The multi-line LCD indicator is permanently updated and adapted during operation to provide the user with optional information as relevant.

During control operation (control with or without adaptation) the following data can be called up by pressing the pushbuttons briefly:

- Position Pos [%]
- Position Pos [°]
- Setpoint SP [%]
- Setpoint SP [mA]
- Control deviation DEV [%]
- Electronics temperature [°C, °F, °R, K]
- Supply pressure PIN [unit]
- Pressure output 1 PY1 [unit]
- Pressure output 2 PY2 [unit]
- Differential pressure DP [unit]
- Universal input value UIN [unit]
- Malfunctions, alarms, messages

The possible reason is also displayed, along with the recommended remedial action.

In the event of an error, a message consisting of an icon and text (e.g., electronics) appears at the bottom of the process display. The text displayed provides information about the area in which the error has occurred.

The error messages are divided into four groups in accordance with the NAMUR classification scheme:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>✗</td>
<td>Error / Failure</td>
</tr>
<tr>
<td>🍀</td>
<td>Functional check</td>
</tr>
<tr>
<td>❓</td>
<td>Out of specification</td>
</tr>
<tr>
<td>⬤</td>
<td>Maintenance required</td>
</tr>
</tbody>
</table>

(The group assignment can only be changed using a DTM or EDD.)

Additionally, the error messages are divided into the following areas:

<table>
<thead>
<tr>
<th>Area</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator</td>
<td>Diagnostics messages affecting the valve or the pneumatic actuator</td>
</tr>
<tr>
<td>Operation</td>
<td>Diagnostics messages affecting the operation of the positioner</td>
</tr>
<tr>
<td>Process</td>
<td>Diagnostics messages relating to the process and displaying problems or states</td>
</tr>
<tr>
<td>Sensor</td>
<td>Alarms informing of problems affecting the reading of the valve position</td>
</tr>
<tr>
<td>Electronic</td>
<td>Displays errors in the device electronics</td>
</tr>
<tr>
<td>Configuration</td>
<td>Detects if the positioner configuration is missing or faulty</td>
</tr>
</tbody>
</table>

Histograms recording
- Positioning time-outs
- Valve movements
- Valve strokes
- Most used valve position
- Universal input

Access to extended monitoring parameters is possible via HART communication, the DTM, and the EDD.

The diagnostics parameters in the operating program provide information about the operating conditions of the actuator. For example:
- Dead band time limit
- Leakage detection
- Temperature monitoring
- Stiction detection
- Sliding friction detection
- Hysteresis
- Valve seat wear

From this information the operator can derive what maintenance work is required, and when.
Diagnostics with DTM
Access to extended monitoring parameters is possible via HART communication, in particular the DTM (reduced functions only with the EDD).

Butterfly diagnostics
The trend (which relates to a number of relevant positioner parameter values) can be used to draw conclusions about the stiction and friction of a valve with a view to enabling preventive maintenance.

If the diagnostic parameters have changed, a triangle is displayed in signal color. The color and size of this triangle represent the direction and scope of the change.

Online trend archive
The online trend archive does not merely indicate the current setpoint and actual value, but also the associated patterns, which can stretch back over a matter of hours. When you start the online trend archive, the saved data is read out and transmitted at such a high transmission rate (100 ms via HART) that the latest data is displayed in next to no time.

Event history
Up to 100 events are saved in the event history in the device. The time each event occurred is also displayed, along with a suggested approach to solving the problem. The limit values for (pre-)alarms, e.g. a friction alarm, can be set.
Valve signature (only with pressure option)
When the valve signature starts, the entire valve operating range is covered for the "open and closed directions". High-resolution plots are generated for the pressure patterns at the diagnostic pressure sensors. In addition, the signal waveform for the universal input is recorded. Once the signature has expired, the parameters selected by the user are loaded from the device and displayed. Depending on the quantity of data selected, it may take several minutes to transfer all the parameter values. Up to 5 valve signatures can be saved in the device; these can be compared so that valve diagnostics can be performed for the purpose of preventive maintenance.

Speed in relation to position test
When the "Speed in relation to position test" is started, the entire valve operating range is covered for the valve’s "open and closed directions" at maximum speed. The positioning times for opening and closing the valves are displayed. The pattern of the graph provides information about friction in the valve and actuator. Up to 5 archived graphs can be saved in the device; these can be compared so that valve diagnostics can be performed for the purpose of preventive maintenance.

Step response test
The step response allows the user to define the start position for the step change. When the start button is pressed, a setpoint step change is generated internally and a high-resolution plot is created for the valve position, pressure patterns, etc. At the end of the step response, the actuator automatically moves to the defined start position and reverts to control mode. Depending on the quantity of data selected, it may take several minutes to transfer all the parameter values and display them in the form of a graph. The pattern of the graph provides information about friction in the valve and actuator. Up to 5 archived graphs can be saved in the device; these can be compared so that valve diagnostics can be performed for the purpose of preventive maintenance.

Valve seat test
During the valve seat test, the actuator is moved in the direction of the 0 % position with maximum force. If the user-defined tolerance window for the 0 % position or the universal input signal is exceeded, this will be shown as an error. This error may be indicative of deposits or extreme wear of the valve seat.
If an ultrasonic sensor is used at the universal input for the purpose of measuring noise at the valve seat, even minor leakage at the valve fitting can be detected. At the end of the test, the positioner moves the valve to the last valid position and reverts to the most recently active control mode.

Leakage test (only with pressure option)
During the leakage test, the positioner closes all pneumatic outputs. Then, if the valve position changes or there is a change in the pressure patterns at the diagnostic pressure sensors, the positioner will be able to detect leakage. It outputs a message indicating the area of the pneumatic piping or actuator that is leaking. At the end of the test, the positioner moves the valve to the last valid position and reverts to the most recently active control mode.
Partial Stroke Test
The Partial Stroke Test is used to check the function of the safe position of ESD (emergency shutdown) valves. The test can be started both locally on the device, time-controlled or using the DTM. The positioner evacuates output 1 until the position change defined in advance occurs. If this does not happen within the set time, an alarm can be output. This helps prevent unexpected failures of the valve.
At the end of the test, the positioner moves the valve to the last valid position and reverts to the most recently active control mode.
There are two separate parameters available for reducing the speed at which the valve moves in the corresponding direction.

Drag indicator
This diagram shows the minimum, maximum, and average values for a selectable parameter in 3 different intervals, which are offset in relation to one another. The drag indicator trend, which is plotted against time, makes it possible to plan preventive action so that a failure in terms of the valves and fittings can be avoided.

Trend histogram
This histogram shows, for example, the position range of the valve within which control is most frequently performed. The parameters to be displayed can be selected by the user. This graph can be used, for example, to determine the most commonly used valve position so that the valve design can be evaluated. The friction within a valve range can be determined on the basis of the differential pressure, dead band time limit alarms, etc.

Fig. 12: Example trend histogram

Trend diagram
This diagram indicates in which valve positioning range the greatest control deviation has occurred. This allows you to derive the valve friction, actuator size or supply air pressure.
Friction detection test (only with pressure option)
Once the function is initiated, a high-resolution plot of the differential pressure and universal input signal is generated for the valve’s entire operating range.
At the end of the test, the positioner moves the valve to the last valid position and reverts to the most recently active control mode.
Limit values for the dynamic friction, stiction and universal input signal can be defined, using 11 reference points in each case. If the corresponding alarms are also activated in "Diagnostics -> Configure diagnostics", alarms can be output during operation as soon as the defined limit values are overshot.

Further diagnostic parameters are possible with the optional pressure sensors. They include:

— Supply air pressure too low
— Supply air pressure too high
— Pressure shocks in the supply air
— Valve signature
— Leakage localization

Additionally, limit values can be defined for these parameters. When they are exceeded, an alarm is reported.

The following values are e.g. determined:
— Number of movements performed by the actuator
— Total travel

Test cycles
Characteristic curves mapping a setpoint cyclically and internally are stored in the device. The DTM can be used to track the position of the actuator. This provides a means of checking the dynamic response of the entire actuator, for example, and determining the limit frequency automatically.

Fig. 13: Example test cycles
Communication

**DTM**
The DTM (Device Type Manager) for the positioner PositionMaster EDP300 is based on FDT/DTM technology (FDT 1.2/1.2.1) and can be either integrated into a control system or loaded on a PC with DAT200 Asset Vision Basic. This allows you to work with the same user interface in the commissioning phase, during operation, and for service tasks involving monitoring the device, setting parameters, and reading out data. Communication is based on the HART protocol. Reading data out from the device has no effect on active operation. Newly set parameters are saved in the non-volatile memory directly upon download to the device, and become active immediately.

**EDD**
The EDD (Electronic Device Description) is used to read and modify simple device parameters on handheld terminals or in the vicinity of the system.
Dimensions

Mounting drawings
All dimensions in mm (inch)

Fig. 14: Top view

Fig. 15: EDP300 positioner with pressure gauge block and filter regulator mounted
Fig. 16: Front and rear views
Fig. 17: Side view (from left to right)

Fig. 18: Mounting to linear actuators to DIN/IEC 534

Fig. 19: Mounting to rotary actuators to VDI/VDE 3845

*) Dimensions A and B are dependent on the rotary actuator
Electrical connections

Fig. 20: Terminal connection diagram

A Basic device  |  B Options
1 Analog input   |  2 Digital input   |  3 Digital output  |  4 Digital feedback  |  5 Analog feedback  |  6 Proximity switches  |
7 Microswitch    |  8 Emergency shutdown module  |  9 Universal input
### Technical Data

#### Inputs

**Two-wire technology**
- **Nominal range**: 4 ... 20 mA
- **Limit values**: Max.: 50 mA (overload), Min.: 3.6 mA
- **Start**: ≥ 3.8 mA
- **Load voltage at 20 mA**: 9.7 V
- **Impedance at 20 mA**: 485 Ω

**Digital input**
- **Nominal range**: 4 ... 20 mA
- **Control voltage**: 0 ... 5 V DC (switching state logical "0")
- **Current**: max. 4 mA

**Universal input**
- **Nominal range**: 4 ... 20 mA
- **Load voltage at 20 mA**: 9.7 V
- **Impedance at 20 mA**: 485 Ω

#### Outputs

**Digital output (control circuit to DIN 19234/NAMUR)**
- **Supply voltage**: 5 ... 11 V DC
- **Switching state logical**
  - "0": Current > 0.35 mA ... < 1.2 mA
  - "1": Current > 2.1 mA
- **Effective direction** (configurable)
  - normally logical "0" or logical "1"

**Alarm output**
- **Nominal range**: 4 ... 20 mA

#### Cable connections

**Electrical connections**
- **4 ... 20 mA input**: Screw terminals max. 2.5 mm² (AWG 14)
- **Options**: Screw terminals max. 1.0 mm² (AWG 18)

**Cable entry**
- 2 threaded bores 1/2-14 NPT/M20 x 1.5 (cable gland/pipe plug optional)

**cross section**
- **Rigid/flexible wires**: 0.14 ... 2.5 mm² (AWG 26 ... AWG 14)
- **Flexible with wire end sleeve**
  - 0.25 ... 2.5 mm² (AWG 23 ... AWG 14)
- **Flexible with wire end sleeve without plastic sleeve**
  - 0.25 ... 1.5 mm² (AWG 23 ... AWG 17)
- **Flexible with wire end sleeve with plastic sleeve**
  - 0.14 ... 0.75 mm² (AWG 26 ... AWG 20)

**Multi-wire connection capacity (2 wires of the same cross section)**
- **Rigid/flexible wires**: 0.14 ... 0.75 mm² (AWG 26 ... AWG 20)
- **Flexible with wire end sleeve no plastic sleeve**
  - 0.25 ... 0.75 mm² (AWG 23 ... AWG 20)
- **Flexible with wire end sleeve with plastic sleeve**
  - 0.5 ... 1.5 mm² (AWG 21 ... AWG 17)

**Options**

**cross section**
- **Rigid/flexible wires**: 0.14 ... 1.5 mm² (AWG 26 ... AWG 17)
- **Flexible with wire end sleeve no plastic sleeve**
  - 0.25 ... 1.5 mm² (AWG 23 ... AWG 17)
- **Flexible with wire end sleeve with plastic sleeve**
  - 0.25 ... 1.5 mm² (AWG 23 ... AWG 17)

**Multi-wire connection capacity (2 wires of the same cross section)**
- **Rigid/flexible wires**: 0.14 ... 0.75 mm² (AWG 26 ... AWG 20)
- **Flexible with wire end sleeve no plastic sleeve**
  - 0.25 ... 0.5 mm² (AWG 23 ... AWG 22)
- **Flexible with wire end sleeve with plastic sleeve**
  - 0.5 ... 1 mm² (AWG 21 ... AWG 18)
## PositionMaster EDP300
### Electro-Pneumatic Positioner

#### Travel

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rotation angle</strong></td>
<td></td>
</tr>
<tr>
<td>Used range</td>
<td>25 ... 270° for rotary actuator 25 ... 60° for linear actuator</td>
</tr>
<tr>
<td><strong>Travel limit</strong></td>
<td>Min. and max. limits, freely configurable in range 0 ... 100 % of total travel (min. range &gt; 20 %)</td>
</tr>
<tr>
<td><strong>Travel time prolongation</strong></td>
<td>Range of 0 ... 200 seconds, separately for each direction</td>
</tr>
<tr>
<td><strong>Dead band time limit</strong></td>
<td>Setting range 0 ... 200 seconds (monitoring parameter for control until the deviation reaches the dead band)</td>
</tr>
</tbody>
</table>

#### Pneumatic connections

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input/Output</strong></td>
<td></td>
</tr>
<tr>
<td>Threaded holes</td>
<td>G 1/4 1/4-18 NPT</td>
</tr>
</tbody>
</table>

| **Compressed air output**            |                                                                             |
| Range                                | 0 ... 10 bar (0 ... 145 psi)                                                |
| Air capacity                         | > 7 kg/h = 5.5 Nm³/h = 3.2 scfm at 1.4 bar (20 psi) supply air pressure     |
|                                     | > 50 kg/h = 40 Nm³/h = 23 scfm at 10 bar (145 psi) supply air pressure       |
| Output function                      | For single or double-acting actuators                                        |
| Shut-off values                      | End position 0 % = 0 ... 45 % End position 100 % = 55 ... 100 %             |

#### Air supply

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Instrument air</strong></td>
<td></td>
</tr>
<tr>
<td>Purity</td>
<td></td>
</tr>
<tr>
<td>max. particle size</td>
<td>5 µm</td>
</tr>
<tr>
<td>Purity</td>
<td></td>
</tr>
<tr>
<td>max. particle density</td>
<td>5 mg/m³</td>
</tr>
<tr>
<td>Oil contents</td>
<td></td>
</tr>
<tr>
<td>max. concentration</td>
<td>1 mg/m³</td>
</tr>
<tr>
<td>Pressure dew point</td>
<td>10 K below operating temperature</td>
</tr>
<tr>
<td>Supply pressure</td>
<td>1.4 ... 10 bar (20 ... 145 psi)</td>
</tr>
<tr>
<td>Air consumption</td>
<td>&lt; 0.03 kg/h/0.015 scfm 2)</td>
</tr>
</tbody>
</table>

1) free of oil, water and dust acc. to DIN / ISO 8573-1
   Pollution and oil content according to Class 3
2) Independent of supply pressure

#### Accessories

**Mounting material**
- Attachment kit for linear actuators to DIN/IEC 534/NAMUR
- Attachment kit for rotary actuators to VDI/VDE 3845
- Attachment kit for integral mounting to control valves
- Attachment kit for actuator-specific mounting to control valves

**Pressure gauge block (optional)**
- With pressure gauges for supply and output pressure.
  Pressure gauges with housing ø 28 mm (1.10 in), with connection block in aluminum, black

**PC adapter for communication**
- USB-HART modem for HART communication (see data sheet 63-6.71)

**PC software for remote configuration and operation**
- DAT200 Asset Vision Basic with DTM for EDP300 (see data sheet DS/DTM/DAT200)
### Housing

**Material/Ingress protection**
- Aluminum: Optional stainless steel 1.4404 (316L)
- Ingress protection: IP 65, NEMA 4X

**Surface/color (aluminum housing only)**
- Dipping varnish: With epoxy resin, stove-hardened
- Housing varnished black: RAL 9005, RAL 9002

**Weight**
- Aluminum: 2.4 kg
- Stainless steel 1.4404 (316L): 5.5 kg

### Mounting orientation

Any

### Transmission data and influences

**Output Y1**
- Increasing setpoint signal: 0 ... 100 %
- Decreasing setpoint signal: 0 ... 100 %

**Action (setpoint signal)**
- Increasing setpoint: 4 ... 20 mA = actuator position 0 ... 100 %
- Decreasing setpoint: 20 ... 4 mA = actuator position 0 ... 100 %

**Characteristic curve (travel = f (setpoint signal))**
- Linear: Equal percentage 1:25 or 1:50 or 25:1 or 50:1
- Deviation: < 0.5 %
- Configurable zone: 0 ... 100 %
- Configurable dead zone: 0.1 ... 10 %
- Resolution (A/D conversion): > 16,000 steps
- Sample rate: 20 ms
- Ambient temperature influence: < 0.5% for each 10 K
- Influence of vibration: < 1 % to 10 g and 80 Hz

1) Freely configurable with 20 reference points

### Seismic vibration

Meets requirements of DIN/IEC 60068-3-3 Class III for strong and strongest earthquakes.

### Influence of mounting orientation

Not measurable.

### Noise emissions

Max. 100 db (A)
Noise-reduced version max. 85 db (A)

### Complies with the following directives

- EMC Directive 89/336/EEC as of May 1989
- EC Directive for CE conformity marking

### Environmental capabilities

**Ambient temperature range**
- For operation, storage, and transport: -40 ... 85 °C (-40 ... 185 °F)
- When using proximity switches SJ2-S1N (NO): 25 ... 85 °C (-13 ... 185 °F)

**Relative humidity**
- Operational with housing closed and air supply switched on: 95 % (annual average), condensation permissible
- Transport and storage: 75 % (annual average)

Influence of vibration meets requirements of DIN/IEC 60068-3-3 Class III for strong and strongest earthquakes.

Influence of mounting orientation not measurable.

Noise emissions max. 100 db (A) noise-reduced version max. 85 db (A)

Complies with the following directives:
- EMC Directive 89/336/EEC as of May 1989
- EC Directive for CE conformity marking

Environmental capabilities:

- Ambient temperature range:
  - For operation, storage, and transport: -40 ... 85 °C (-40 ... 185 °F)
  - When using proximity switches SJ2-S1N (NO): 25 ... 85 °C (-13 ... 185 °F)

- Relative humidity:
  - Operational with housing closed and air supply switched on: 95 % (annual average), condensation permissible
  - Transport and storage: 75 % (annual average)

1) Freely configurable with 20 reference points
Optional upgrades

Module for analog position feedback

<table>
<thead>
<tr>
<th>Signal range</th>
<th>4 ... 20 mA (configurable split ranges)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply, 2-wire circuitry</td>
<td>24 V DC (10 ... 30 V DC), 48 V DC (20 ... 48 V DC, no explosion protection)</td>
</tr>
<tr>
<td>Characteristic curve</td>
<td>Increasing or decreasing (configurable)</td>
</tr>
<tr>
<td>Deviation</td>
<td>&lt; 1 %</td>
</tr>
</tbody>
</table>

Without a signal from the positioner (e.g., “no power” or “initializing”) the module sets the output to > 20 mA (alarm level).

Module for digital position feedback

Two switches for digital position feedback (position adjustable within the range of 0 ... 100 %, ranges cannot overlap)
Current circuits acc. to DIN 19234 / NAMUR

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>5 ... 11 V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal current</td>
<td>&lt; 1.2 mA: Switching state logical &quot;0&quot;</td>
</tr>
<tr>
<td></td>
<td>&gt; 2.1 mA: Switching state logical &quot;1&quot;</td>
</tr>
<tr>
<td>Direction of action</td>
<td>normally logical &quot;0&quot; or logical &quot;1&quot;</td>
</tr>
<tr>
<td></td>
<td>(configurable)</td>
</tr>
</tbody>
</table>

Module for universal input

Module for a 4 ... 20 mA input for universal use.
The range can be scaled. It is used for advanced valve diagnostics. For example, an ultrasonic sensor can be connected to detect a faulty valve seat or a phonometer can be connected to detect cavitation. The limit values for detecting overshoot can be freely selected.

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>24 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal range</td>
<td>4 ... 20 mA</td>
</tr>
</tbody>
</table>

Module for the emergency shutdown function

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>24 V DC (20 ... 30 V DC) (electrically isolated from input signal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe position active</td>
<td>At voltage &lt; 5 V</td>
</tr>
</tbody>
</table>

Explosion protection: see certificate (operating instructions)

1) There are two slots for the option modules. Any combination of different option modules is possible. However, identical option modules cannot be combined.

A separate 24 V DC signal is applied to the emergency shutdown module; it connects the signal from the microprocessor through to the I/P module.

When the 24 V DC signal is interrupted, the pneumatic module executes the respective safety function, depending on the mechanical construction:
The positioner output 1 is depressurized, and the valve is moved to the safe position. In case of a "double-acting" actuator the second output 2 is additionally pressurized.
The emergency shutdown module works independently of the mother board, i.e., all information from the actuator is available in the control system at any time.
Digital position feedback with proximity switches
Two proximity switches for independent position signaling. Switching points adjustable between 0 ... 100 %
Current circuits acc. to DIN 19234 / NAMUR

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>5 ... 11 V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal current</td>
<td>&lt; 1.2 mA: Switching state logical &quot;0&quot;</td>
</tr>
</tbody>
</table>

Direction of action (logical state)

<table>
<thead>
<tr>
<th>Proximity switch</th>
<th>Position</th>
<th>&lt; Lim. 1</th>
<th>&gt; Lim. 1</th>
<th>&lt; Lim. 2</th>
<th>&gt; Lim. 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SJ2-SN (NC)</td>
<td></td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>SJ2-S1N (NC)</td>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

When using proximity switch SJ2_S1N (NO), the positioner may only be used at an ambient temperature range of -25 ... 85 °C (-13 ... 185 °F).

Digital position feedback with 24 V microswitches
Two microswitches for independent position signaling. Switching points adjustable between 0 ... 100 %.

<table>
<thead>
<tr>
<th>Voltage</th>
<th>max. 24 V AC / DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load rating</td>
<td>max. 2 A</td>
</tr>
<tr>
<td>Contact surface</td>
<td>10 μm Gold (AU)</td>
</tr>
</tbody>
</table>

Mechanical position indicator
Indicator disk in enclosure cover, linked with positioner feedback shaft.

Contactless position sensor (option)
In difficult ambient conditions (constant valve movements, for example, which are transmitted to the sensor axis by the process pressure), the positioner can be fitted with a contactless position sensor.

Pressure option
The pressure option comprises 3 absolute pressure sensors which facilitate pressure-based valve diagnostics (valve signature, for example).
The supply air pressure and the output pressures can also be monitored. The zero points of the pressure sensors can be calibrated both locally on the device and using the DTM.

These options are also available for retrofitting by Service.
# Ordering information

**Basic ordering information for PositionMaster Electro-Pneumatic Positioner EDP300**

Select one character or set of characters from each category and specify complete catalog number. Refer to additional ordering information and specify one or more codes for Positioner if additional options are required.

<table>
<thead>
<tr>
<th>Base model – 1st to 6th characters</th>
<th>EDP300</th>
<th>XX</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>PositionMaster Electro-Pneumatic Positioner EDP300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Explosion Protection Certification** – 7th und 8th character

- Without: Y0
- ATEX II 2 G Ex ia IIC T4 … T6 Gb: A1
- ATEX II 3 G Ex nA IIC T4 … T6 Gc): B1
- ATEX II 2 D Ex ia IIIC T 100°C … T55°C Db: B3
- ATEX II 3 D Ex ic IIIC T100°C … T55°C Dc: B5
- ATEX II 3 D Ex tc IIIC T100°C … T55°C Dc: B7
- FM IS Class I, II, III Div. 1 Groups A, B, C, D, E, F, G: F1
- CSA Intrinsically Safe Class I, II, III Div. 1 Groups A, B, C, D, E, F, G: C1
- IECEx Ex ia IIC T4 … T6 Gb: M1
- IECEx Ex nA IIC T4 … T6 Gc: N1
- IECEx Ex ia IIIC T100°C … T55°C Db: N3
- IECEx Ex ic IIIC T100°C … T55°C Dc: N5
- IECEx Ex tc IIIC T100°C … T55°C Dc: N7
- NEPSI China - Ex ia II C T6: S1
- KOSHA Korea - Ex ia II C T6: S5
- CEPEL Brasilien - Ex ia II C T6: J1

**Input Signal / Communication Port** – 9th character

- 4 … 20 mA: A
- HART digital communication and 4 … 20 mA: H

**Pneumatic Output Type** – 10th character

- Single acting: 1
- Double acting: 2

**Safe Position** – 11th character

- Fail-safe: S
- Fail-freeze: F

**Air Pipe Connection** – 12th character

- Thread G 1/4 female: 1
- Thread 1/4-18 NPT female: 2
- Others: (Note1)

**Cable Conduits** – 13th character

- M20 x 1.5 with cable gland: A
- NPT 1/2 in. with cable gland: (Note1)
- Thread M20 x 1.5 female: B
- Thread NPT 1/2 in. female: (Note1)
- Others: Z
### Additional order information for PositionMaster Electro-Pneumatic Positioner EDP300

All required options have to be entered by adding a one-digit or two-digit code or codes after the main order number.

<table>
<thead>
<tr>
<th>Option Module Slot 1</th>
<th>XX</th>
<th>XX</th>
<th>XX</th>
<th>XX</th>
<th>XX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog feedback output</td>
<td>A1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital feedback output</td>
<td>A2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analog universal input</td>
<td>A3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Option Module Slot 2</th>
<th>XX</th>
<th>XX</th>
<th>XX</th>
<th>XX</th>
<th>XX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog feedback output</td>
<td>B1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital feedback output</td>
<td>B2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analog universal input</td>
<td>B3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency shutdown module</td>
<td>B4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Usage Certifications

<table>
<thead>
<tr>
<th>Certification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspection certificate 2.1 acc. EN 10204, Declaration of Conformity</td>
<td>C4</td>
</tr>
<tr>
<td>Inspection certificate 2.1 acc. EN 10204, Declaration of Conformity, with description</td>
<td>CP</td>
</tr>
<tr>
<td>Test report 2.2 acc. EN 10204</td>
<td>C5</td>
</tr>
<tr>
<td>Inspection Certificate 3.1 acc. EN 10204, with maximum deviation</td>
<td>C6</td>
</tr>
<tr>
<td>SIL 2 - Declaration of Conformity (Note2)</td>
<td>CS</td>
</tr>
</tbody>
</table>

### Position Indicator

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Indicator, integrated into cover</td>
<td>D1</td>
</tr>
</tbody>
</table>

### Limit Switches

<table>
<thead>
<tr>
<th>Switch Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microswitches</td>
<td>(Note3) F1</td>
</tr>
<tr>
<td>Proximity switches (NC) SJ2-SN</td>
<td>F2</td>
</tr>
<tr>
<td>Proximity switches (NO) SJ2-S1N</td>
<td>(Note4) F3</td>
</tr>
</tbody>
</table>

### Housing Material

<table>
<thead>
<tr>
<th>Material</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stainless steel</td>
<td>H1</td>
</tr>
</tbody>
</table>
PositionMaster EDP300
Electro-Pneumatic Positioner

<table>
<thead>
<tr>
<th>Additional order information for PositionMaster Electro-Pneumatic Positioner EDP300</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Position Sensor Type</strong></td>
</tr>
<tr>
<td>Integrated contactless sensor</td>
</tr>
<tr>
<td>Remote contactless sensor</td>
</tr>
<tr>
<td><strong>Special Applications</strong></td>
</tr>
<tr>
<td>Operation with natural gas</td>
</tr>
<tr>
<td>With noise reduction</td>
</tr>
<tr>
<td><strong>Pressure Gauge Block Type</strong></td>
</tr>
<tr>
<td>0 ... 1,2 MPa (0 ... 12 bar, 0 ... 180 psi)</td>
</tr>
<tr>
<td><strong>Diagnosis Module</strong></td>
</tr>
<tr>
<td>Pressure sensors</td>
</tr>
<tr>
<td><strong>Additional TAG Plate</strong></td>
</tr>
<tr>
<td>Stainless steel 18.5 mm x 65 mm (0.73 in. x 2.5 in.)</td>
</tr>
<tr>
<td>Sticker 11 mm x 25 mm (0.44 in. x 1 in.)</td>
</tr>
<tr>
<td><strong>Mounting Options</strong></td>
</tr>
<tr>
<td>Prepared for integral mounting</td>
</tr>
</tbody>
</table>

**Note 1:** Needed for FM / CSA certification
**Note 2:** With single acting, fail safe pneumatic only
**Note 3:** Not for Ex-versions
**Note 4:** Only for ambient temperature -25 ... 85 °C

### Accessories

<table>
<thead>
<tr>
<th>Mounting bracket</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDP300 / TZIDC Mounting bracket for rotary actuators (mounting to VDI / VDE 3845), dimension A/B = 80/20 mm</td>
<td>319603</td>
</tr>
<tr>
<td>EDP300 / TZIDC Mounting bracket for rotary actuators (mounting to VDI / VDE 3845), dimension A/B = 80/30 mm</td>
<td>319604</td>
</tr>
<tr>
<td>EDP300 / TZIDC Mounting bracket for rotary actuators (mounting to VDI / VDE 3845), dimension A/B = 130/30 mm</td>
<td>319605</td>
</tr>
<tr>
<td>EDP300 / TZIDC Mounting bracket for rotary actuators (mounting to VDI / VDE 3845), dimension A/B = 130/50 mm</td>
<td>319606</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mounting kit for linear actuators</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDP300 / TZIDC Attachment kit for linear actuators, stroke 10 ... 35 mm</td>
<td>7959125</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for linear actuators, stroke 20 ... 100 mm</td>
<td>7959126</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lever</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDP300 / TZIDC Lever 30 mm</td>
<td>7959151</td>
</tr>
<tr>
<td>EDP300 / TZIDC Lever 100 mm</td>
<td>7959152</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adapter</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDP300 / TZIDC Adapter (shaft coupler) for rotary actuators (mounting to VDI / VDE 3845)</td>
<td>7959110</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressure gauge block</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDP300 / TZIDC Pressure gauge block, 0.6 MPa, single acting, G 1/4 connection</td>
<td>7959364</td>
</tr>
<tr>
<td>EDP300 / TZIDC Pressure gauge block, 0.6 MPa, single acting, Rc 1/4 connection</td>
<td>7959358</td>
</tr>
<tr>
<td>EDP300 / TZIDC Pressure gauge block, 0.6 MPa, single acting, NPT 1/4 connection</td>
<td>7959360</td>
</tr>
<tr>
<td>EDP300 / TZIDC Pressure gauge block, 0.6 MPa, double acting, G 1/4 connection</td>
<td>7959365</td>
</tr>
<tr>
<td>EDP300 / TZIDC Pressure gauge block, 0.6 MPa, double acting, Rc 1/4 connection</td>
<td>7959359</td>
</tr>
<tr>
<td>EDP300 / TZIDC Pressure gauge block, 0.6 MPa, double acting, NPT 1/4 connection</td>
<td>7959361</td>
</tr>
<tr>
<td>Accessories</td>
<td>Order number</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for Badger Meter ATC 754/755</td>
<td>7959123</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for Fisher 1051-30, 1052-30</td>
<td>7959214</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for Fisher 1061 size 130</td>
<td>7959206</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for Fisher 471</td>
<td>7959195</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for Fisher 585 C</td>
<td>7959250</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for Fisher 657 / 667 Size 10 ... 30 mm</td>
<td>7959177</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for Fisher Guide 32/34</td>
<td>7959344</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for GEMU 690/25 and 50</td>
<td>7959103</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for Guide DK</td>
<td>7959161</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for Keystone 79U/E-002(S) ... 79U/E-181(S)</td>
<td>7959147</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for Masoneilan CAMFLEX II, VARIMAX, MINITORK II</td>
<td>7959144</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for Masoneilan VariPak 28000 series</td>
<td>7959163</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for MaxFlo MaxFlo</td>
<td>7959140</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for NAF 791290</td>
<td>7959207</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for NAMUR stroke 100 ... 170 mm</td>
<td>7959339</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for NELES B06-20, B1C6-20, B1J8-20, B1J8-20</td>
<td>7959146</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for Valves Nuovo Pignone, lever for linear stroke, length 150 ... 250 mm</td>
<td>7959210</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for Valves Nuovo Pignone, pressure gauge block with 2 manometers, material stainless steel</td>
<td>7959181</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for Samson 241, 271, 3271</td>
<td>7959145</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for Samson 3277</td>
<td>7959136</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for Schubert &amp; Salzer GS 8020 / 8021 / 8023</td>
<td>7959200</td>
</tr>
<tr>
<td>EDP300 / TZIDC Attachment kit for SED stroke 100 mm</td>
<td>7959141</td>
</tr>
<tr>
<td>EDP300 / TZIDC Form - locking shaft adapter</td>
<td>7959371</td>
</tr>
</tbody>
</table>