Automation

SMARTRONIC PC

R1312

Type Series Booklet

Legal information/Copyright

Type Series Booklet SMARTRONIC PC

Contents

Automation

Intelligent Positioners

SMARTRONIC PC

Main applications

- Water
- Waste water
- Energy
- Industry
- Shipbuilding
- Oil and gas

Operating data

Table 1: Properties

Ambient characteristics	Value
Min. permissible temperature [°C]	≥ -20
Max. permissible temperature [°C]	≤ +80
Enclosure	IP67 to EN 60529
Electromagnetic compatibility	To European Electromagnetic Compatibility Directive 2014/30/EU
Wi-Fi version	To European Directive 2014/53/EU (RED)
Vibrations	To IEC 68-2-6 Test Fc
Compressed air purity class	ISO 8573-1 Class 5

Design details

Design

- SMARTRONIC PC is an intelligent positioner.
- For automation of:
  - Pneumatic quarter-turn actuators of the ACTAIR NG and DYNACTAIR NG type series
  - Quarter-turn actuators with standardised VDI/VDE 3845 interface
  - Linear actuators to NAMUR
- Position indicator under sight glass for remote indication
- All SMARTRONIC PC versions feature the following functions:
  - Compressed air supply
  - Position indicator
  - Intelligent control
  - Monitoring the valve/actuator unit via an integrated printed circuit board with programmable microprocessor
- The compressed air supply is connected via the base:
  - Direct (without piping) for the ACTAIR NG and DYNACTAIR NG type series
  - Via external piping for quarter-turn actuators with standardised VDI/VDE 3845 interface and for linear actuators to NAMUR
- Open/Closed position signalling
- The actuating times for open/close operations are set via the easily accessible air flow reducer.
- Its design is based on a programmable microcontroller whose control and monitoring algorithms have been developed by KSB.

Variants

- Programmable curves for valve opening and closing
- Intelligent positioning
- Monitoring via external signal source
- Control function
- Filter tank level control
- Communication via RS232/USB
- Communication via Ethernet
- Communication via Wi-Fi
- Field bus Profibus DP

Product benefits

- SMARTRONIC PC provides various innovative control functions:
  - Intelligent positioning
  - Control of physical quantities
  - Protection against pressure surges
- SMARTRONIC PC can process and display process-related alarms. If there is any risk, it can move the valve into fail-safe position.
- User-friendly with software installed on a notebook or laptop

Related documents

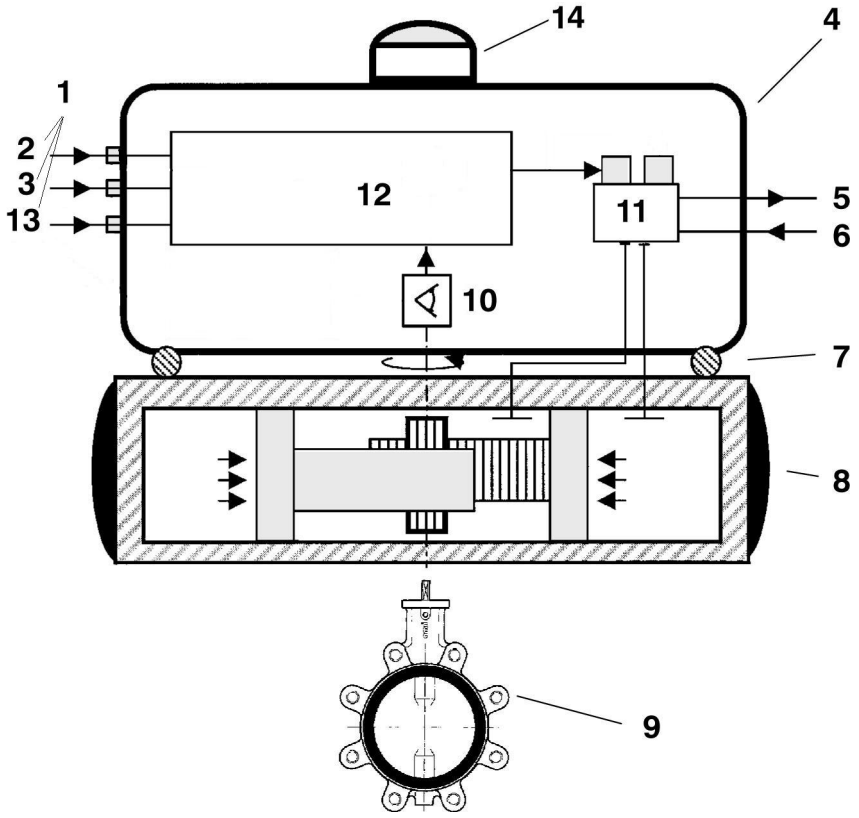
Table 2: Information/documents

Document	Reference number
SMARTRONIC PC operating manual	8520.8051

8520.805/02-EN

Technical data

Functional schematic



1. Connections
2. Connection to user interface (MMI)

   Both the configuration of SMARTRONIC PC and real-time display of process data are performed via a serial interface, Ethernet or Wi-Fi using a PC.
3. Connection to process control system

   The open- and closed-loop control information of SMARTRONIC PC can be transmitted to the PLC and the monitoring PC via a power cable or via field bus (Profibus DP).
4. SMARTRONIC PC
5. Exhaust
6. Compressed air
7. VDI/VDE interface
8. Pneumatic actuator
9. Valve
10. Position indicator

    The disc position is determined by an angle sensor mounted on the actuator's actuating shaft. This information is transmitted to the microprocessor and the PLC for processing. The angle sensor automatically adapts sensor travel to actuator travel.

    A 4 - 20 mA signal provides actual-position feedback **3** to the process control system.
11. Integrated pneumatic control

    The pneumatic solenoid valve is integrated in SMARTRONIC PC. The compressed air is supplied via the VDI/VDE interface, external pneumatic connections are not required (up to ACTAIR NG 160 and DYNACTAIR NG 80). The open/close solenoid valve is a 4/3 directional control valve. It is controlled via two pilot solenoid valves. The fail-safe (Fail Open or Fail Close) position in the event of a power supply failure must be specified for each unit in the purchase order.
12. Integrated microprocessor

    The integrated microprocessor processes all information and carries out the specific open- and closed-loop control algorithms for each version of SMARTONIC PC, It controls the communication with the user interface (MMI), the process control system or the field bus (Profibus DP).
13. External signal source

    An analog external signal source can be connected to SMARTRONIC PC, which processes the measured values directly. The measured values are used for control or process monitoring.
14. Visual position indicator

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Technical specification

Control unit	
Material	Polycarbonate with 20 % glass fibre
Position indicator	Visual position indicator on the cover
Compressed air connection	1 x 1/4" gas ports
Electrical connection	- To the MMI (RS232 and Ethernet): 5-pole M12 socket - To the MMI (Wi-Fi): Wi-Fi aerial - To the PLC and external signal source: 2 cable glands for a cable diameter of 6 to 12 mm.
Integrated connectors	- Spring-type connection - Cable length to be stripped: 8 mm - For rigid or flexible conductors, with a cross-section of 0.14 mm^2 (26 AWG) to 0.5 mm^2 (20 AWG) - For flexible conductors with wire end sleeve with a cross-section of 0.25 mm^2 (23 AWG) to 0.5 mm^2 (20 AWG)
Weight	1.7 kg

Compressed air supply	
Compressed air supply port	Port "P" with filter fitted in the base
Exhaust	Port "E",1/4" gas port, with silencer or for connection to an exhaust system
Operating pressure	3 to 8 bar (44 to 115 psi)
Filtration	ISO 8573-1 Class 7 (< 40 µm)
Dew point	ISO 8573-1 Class 5 (< 7 °C and in all cases < 5 °C below the ambient temperature)
Lubrication	ISO 8573-1 Class 5 (< 25 mg/m^3)
Maximum flow rate	400 Nl/min
Consumption in fail-safe position	Zero

Power supply	
Max. voltage	30 V DC
Min. voltage	20 V DC
Power input	6.3 W max.

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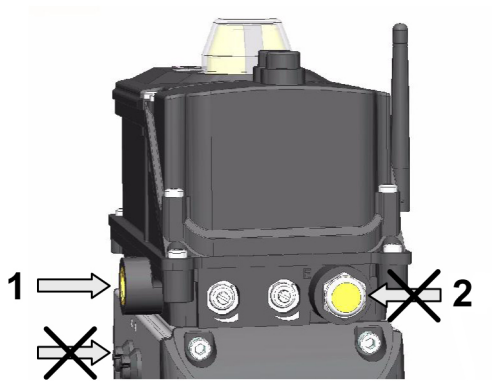
Compressed air supply

To be connected at SMARTRONIC PC.

A sintered bronze filter is fitted in the housing's inlet port for safety reasons to prevent clogging and damage to the pneumatic directional control valve.



The operating pressure ranges from 2 to 8 bar.

To prevent any premature wear of mechanical components, especially actuator components, the use of oil-lubricated compressed air (between 5 and 25 mg/m) is recommended.[3]

1 - Compressed air supply

2 - Exhaust

Compressed air supply: port "P".

Exhaust: port "E", with silencer or for connection to an exhaust system

Programmable curves for opening/closing

- Actuation is triggered by a volt-free On/Off contact (PLC).
- The operator can freely enter the actuating time for the valve as well as the time-controlled actuation curves for opening and closing.
- The two actuation curves can be parameterised on the basis of 20 points. The microcontroller continuously compares the disc position with the programmed curve.
- This avoids pressure surges.

Intelligent positioning

- The disc position is controlled via an external 4 - 20 mA setpoint signal.
- The user defines the signal value which triggers the complete closing or opening of the valve. This option is used for valves operated in split-range mode.
- The user can also configure the actuation curve of a disc according to the external signal.

  This means valve actuation will be either linear or in accordance with an application-specific curve (disc as a linear control element).

Process monitoring

- Valve opening and closing is programmed.
- An external signal source directly connected to SMARTRONIC PC allows the implementation of monitoring and safety functions.
- The user can define two limits for this external signal source (4 - 20 mA signal) and determine a fail-safe position.

Control

- A PID control algorithm allows the control of a physical quantity transmitted by an external signal source which is connected directly to SMARTRONIC PC.
- This external signal source (4 - 20 mA) can be supplied with 24 V voltage by the control unit.
- An Open/Close control allows the selection of SMARTRONIC PC's operating mode: automatic or manual.
- If the controller is in
  - **automatic mode,** it will control a physical quantity transmitted by the signal source.

    The external setpoint input corresponds to a control setpoint.
  - Example: 400 m3/h, if the flow rate is measured at the external signal source input
  - **manual mode,** it is used as a positioner.

    The external setpoint input (4 - 20 mA signal or Profibus) corresponds to a position setpoint.
  - Example: Valve opening angle is 45°
- The emergency shutdown ensures that the valve is closed automatically.

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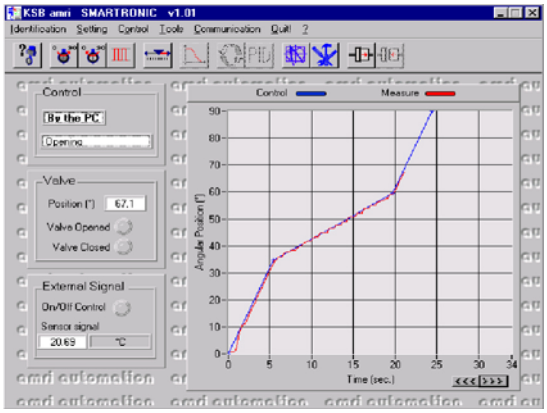
Filter tank level control

- The control task is to keep the water level in a filter tank constant; the water in the tank is filtered through anti-bacterial sand or charcoal filters.
- SMARTRONIC PC is installed at the tank's outlet, where it compensates gradual filter clogging and the pressure losses this entails as well as fluctuations in the water volume entering the filter tank.
- Alongside classic control functions, SMARTRONIC PC features specific control algorithms which allow the water level in filter tanks to be controlled.

User interface

- The user interface can be accessed from a PC.
- It ensures straightforward commissioning, parameterisation and display of SMARTRONIC PC operating data, both locally and remotely.
- The user interface can be downloaded free of charge. Depending on the technology used, connection kits can be purchased to connect the user interface with SMARTRONIC PC (USB, Ethernet, Wi-Fi).
  The following example shows a time-dependent actuation curve (programmable opening/closing curves function).



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Profibus DP

Table 3: Operating properties

SMARTRONIC PC Profibus DP meets the requirements of the EN 50170 and DIN 19245 Profibus standards.			
For use with	SMARTRONIC PC Profibus DP is suitable for use with all pneumatic actuators from the ACTAIR NG and DYNACTAIR NG type series.		
Topology	Bus, tree with repeater option		
Medium	Twisted-pair cables, RS 485 interface		
Network speed and length	Baud rate (kbits/s)	Length (without repeater)	Length (with repeater)
Profile/version	9,6	1200 m	10 km
	19,2	1200 m	10 km
	45,45	1200 m	10 km
	93,75	1200 m	10 km
	187,5	1200 m	6 km
	500	1000 m	1 km
	1500	400 m	600 m
		200 m	
Max. number of stations	32, up to 126 with repeater		
Bus access	Polling of the master to the slave components (design with one or more masters)		
Addressing	2 decimal encoding wheels on the printed circuit board of SMARTRONIC PC		
Control bus variables	6 input bytes 6 output bytes		
Bus terminator	A terminal resistor is integrated in each slave component of SMARTRONIC PC Profibus DP which can be activated via a switch on the printed circuit board.		
Supported operations	Cyclic data exchange, Sync mode, Freeze mode		

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Materials

SMARTRONIC PC materials

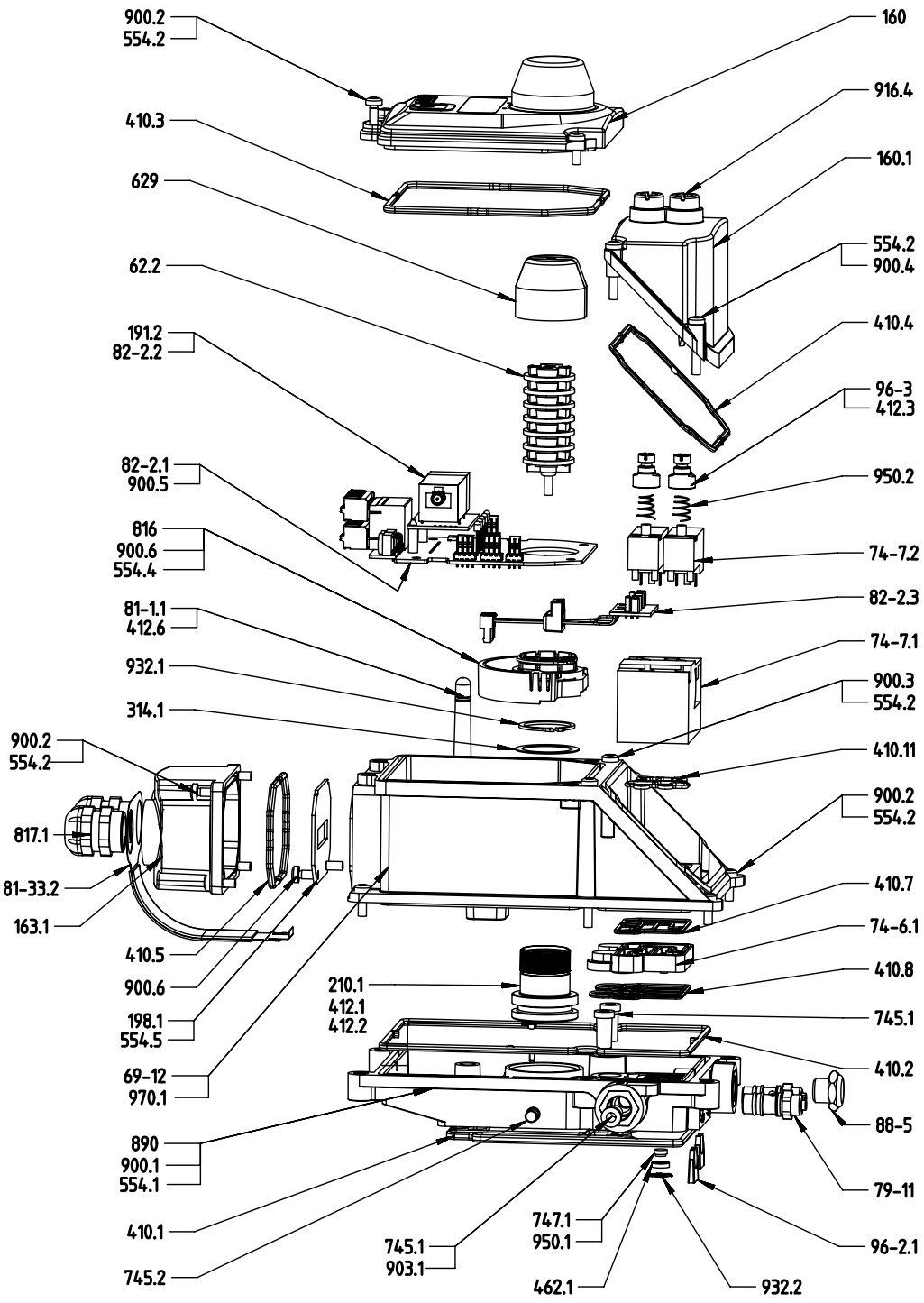

Fig. 1: Exploded view of R1312

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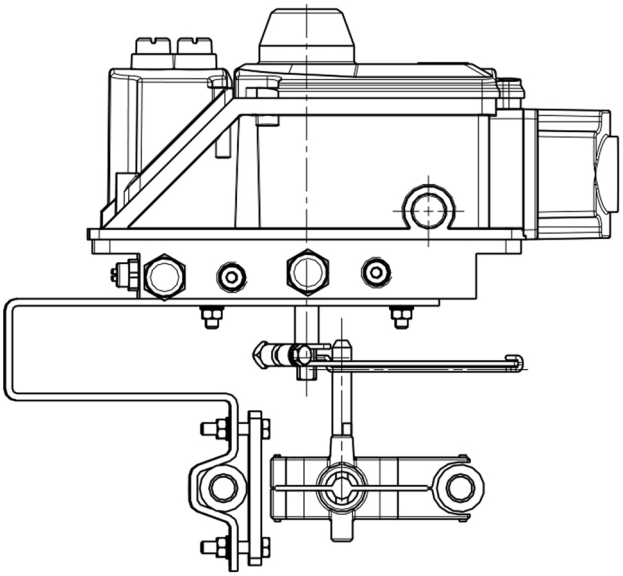
Table 4: List of components

Part No.	Description	Materials
160	Cover	Polycarbonate with 20 % glass fibre
160.1	Cover (directional control valve)	Polycarbonate with 20 % glass fibre
163.1	Housing	Polycarbonate with 20 % glass fibre
191.2	Support	PA 6.6
198.1	Connection plate	
210.1	Actuating shaft	Polycarbonate
314.1	Anti-friction disc	Stainless steel, type 304L
410.1	Profile seal	NBR70
410.2	Profile seal	NBR70
410.3	Profile seal	NBR70
410.4	Profile seal	NBR70
410.5	Profile seal	NBR70
410.7	Profile seal	NBR70
410.8	Profile seal	NBR70
410.11	Profile seal	NBR70
412.1	O-ring	NBR70
412.2	O-ring	NBR70
412.3	O-ring	NBR70
412.6	O-ring	NBR70
462.1	Cup washer	
554.1	Washer	Stainless steel
554.2	Washer	Stainless steel
554.4	Serrated lockwasher	Steel
629	Position indicator assembly	
62-2	Adjustable cams assembly	
69-12	Control unit	Polycarbonate with 20 % glass fibre
745.1	Sintered filter	
745.2	Sintered filter	Bronze
74-6.1	Distribution plate	
74-7.1	Directional control valve	
74-7.2	Pilot valve	
747.1	Profile seal, valve	
79-11	Flow reducer RP 1/8"	
816-1.1	Plug connector / aerial assembly	
81-84.1	Circuit diagram	
816	Angle sensor assembly	
817.1	Plug	
82-2.1	Printed circuit board	
82-2.2	Communication card assembly	
88-5	1/4'' BSP silencer	Bronze
890	Base	Polycarbonate with 20 % glass fibre
96-2.1	Locking plate	Polycarbonate
96-3	Manual override	Polycarbonate
900.1	Bolt/screw	A2-70
900.2	Bolt/screw	A2-70
900.3	Bolt/screw	A2-70
900.4	Bolt/screw	A2-70
900.5	Bolt/screw	A2-70
900.6	Self-tapping screw	A2-80
903.1	Plug	
916.1	Screw plug	
916.2	Protecting plug	Rubber
916.4	Elastomer string	NBR HT 70
932.1	Circlip	Steel
932.2	Reinforced circlip	Steel
950.1	Valve disc spring	
950.2	Manual override spring	Stainless steel
970.1	Sticker	Adhesive polyester

Variants

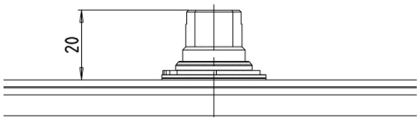
Adaptation for mounting on linear actuators to NAMUR

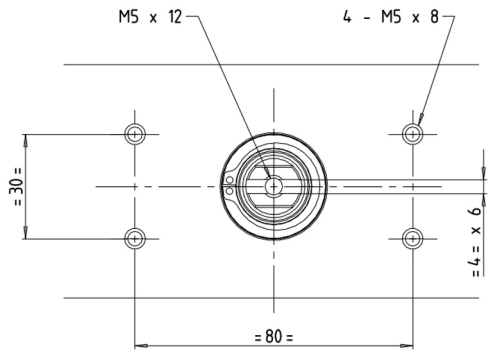


Front view

Mounting flange for actuators with VDI/VDE 3845 interface, not applicable to ACTAIR and DYNACTAIR

Front view





Dimensions to VDI/VDE 3845

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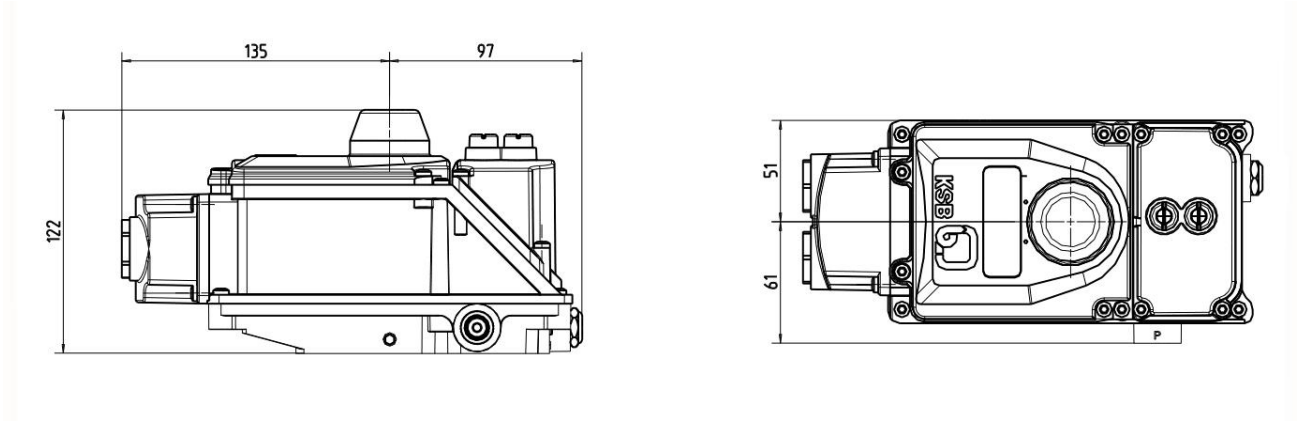
Dimensions

SMARTRONIC PC dimensions



Type R1312

Purchase order data

SMARTRONIC PC	R001312	0	0	0	0	0	4	.	R	7	.	.	.	.	0	6	.	.
Signalisation																		
Auto-calibration		0	0	0	0													
Position																		
Fictitious open/closed						0												
Actual-position feedback																		
Actual-position feedback via active 4 - 20 mA signal (2-wire system)							4											
Electrical output																		
2 cable glands, M20 IP67 (diameter: 6 to 12)								2										
Solenoid valve																		
4/3 closed in centre position - Position (POS)									R									
Voltage, solenoid valve																		
24 V DC										7								
Actuator																		
ACTAIR 3 to 200 with closed-position travel stop											2							
ACTAIR 3 to 200, with open-position travel stop											3							
ACTAIR 400 to 1600 DYNACTAIR 1.5 to 25 normally closed											4							
											6							
DYNACTAIR 1.5 to 25 normally open											7							
DYNACTAIR 50 to 100 normally closed											8							
DYNACTAIR 50 to 100 normally open											9							
DYNACTAIR 200 to 800 normally closed											J							
DYNACTAIR 200 to 800 normally open											K							
ACTAIR NG 2 to 700											L							
DYNACTAIR NG 1 to 350 normally closed											M							
DYNACTAIR NG 1 to 350 normally open											N							
Pneumatic quarter-turn actuator, double-acting											W							
Pneumatic quarter-turn actuator, single-acting											X							
Pneumatic linear actuator, double-acting											Y							
Pneumatic linear actuator, single-acting											Z							
Fail-safe position																		
Fail Close in the event of power failure												A						
Fail Open in the event of power failure												B						
Fail Last in the event of power failure												C						
SMARTRONIC																		
Programmable curves for opening/closing													1					
Intelligent positioner													2					
Monitoring external sensor													3					
Field bus																		
None														0				
Profibus DP														2				
Heating resistor																		
None															0			
Display																		
3D sight glass																6		
Configuration																		
RS232 (plug connector M12x1.5)																	1	
Ethernet (plug connector M12x1.5)																	2	
Wi-Fi 802.11																	3	
Diagnosis																		
None																		0

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06/01/2022

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