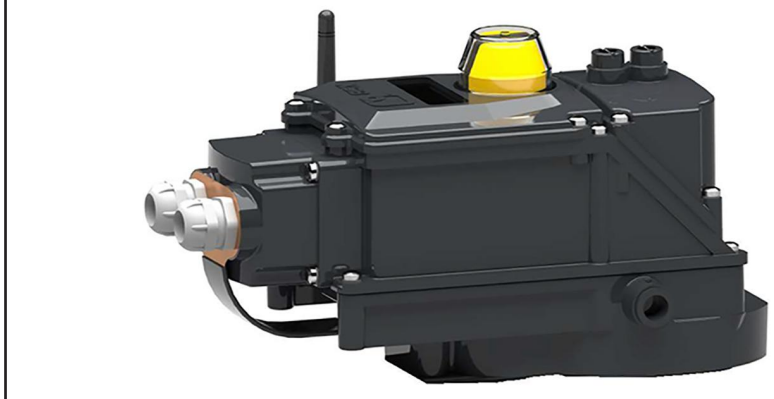
Automation

SMARTRONIC U PC

A1312

Type Series Booklet



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Type Series Booklet SMARTRONIC U PC

Contents

Automation

Intelligent Positioners

SMARTRONIC U 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 U PC is an intelligent positioner.
- For automation of:
  - Quarter-turn actuators of the ACTAIR EVO, DYNACTAIR EVO type series and all older KSB actuator generations
  - Quarter-turn actuators with standardised VDI/VDE 3845 interface
  - Linear actuators to NAMUR
- Position indicator under sight glass for remote indication
- All SMARTRONIC U PC versions feature the following functions:
  - Control air supply
  - Position indicator
  - Intelligent control
  - Monitoring the valve/actuator unit via an integrated printed circuit board with programmable microprocessor
- The control air supply is connected via the aluminium base:
  - Directly to ACTAIR EVO, DYNACTAIR EVO and all older KSB actuator generations
  - 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 U PC is a multifunctional control unit which provides various innovative control functions:
  - Intelligent positioning
  - Control of process variables
  - Pressure surge control
- SMARTRONIC U PC can process and display process-related alarms. If there is any risk, it can move the valve into the fail-safe position.
- User-friendly with software installed on a notebook or laptop
- The aluminium actuating shaft increases the unit's service life.
- TORX T20 captive screws for easier installation

Related documents

Table 2: Information/documents

Document	Reference number
SMARTRONIC U PC A1312 operating manual	8520.8054

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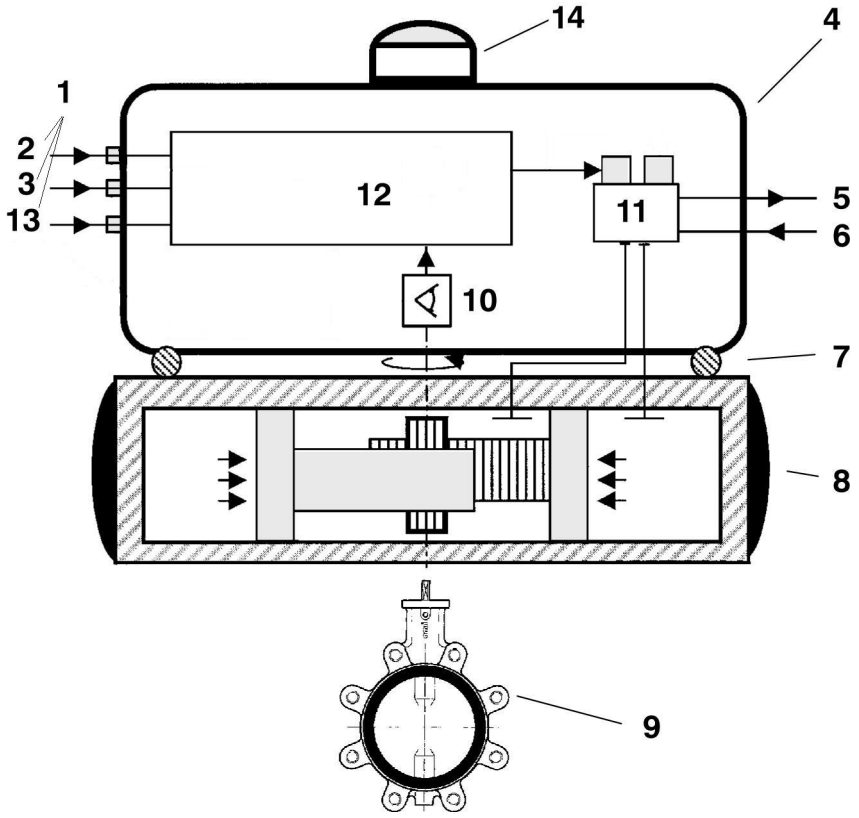
Technical data

Functional schematic



1. Connections
2. Connection to user interface

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

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

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

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

    The pneumatic directional control valve is integrated in the SMARTRONIC U PC. The control air is directly supplied via the VDI/VDE interface, external pneumatic connections are not required (up to ACTAIR EVO 160 and DYNACTAIR EVO 80). The directional control valve is an on/off valve with 4 ports and 3 positions. It is controlled via two pilot solenoid valves. The fail-safe (Fail Closed or Fail Open) position in the event of a power loss must be specified in the purchase order for each directional control valve.
12. Integrated microprocessor

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

    An analog external signal source can be connected to SMARTRONIC U 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 + aluminium alloy
Position indicator	Visual position indicator on the cover
Control air connection	1 x 1/4" threaded 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 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 and without insulating input sleeve, with a cross-section of 0.25 mm^2 (23 AWG) to 0.5 mm^2 (20 AWG)
Weight	2,4 kg

Control air supply	
Control air supply port	Port "P" with filter fitted in the base
Exhaust port	Port "E",1/4" threaded 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)
Max. flow rate	400 Nl/min
Consumption in "at rest" position	Zero

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

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Compressed air supply

The control air is connected to the SMARTRONIC U 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.

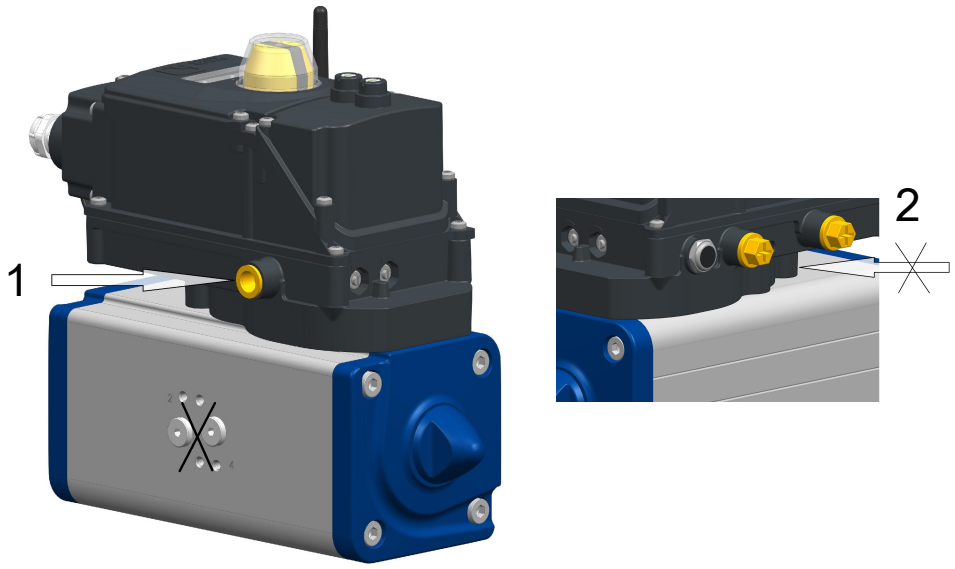

Fig. 1: View of control air connection

1 - Control air supply

2 - Exhaust

Control air port: port "P"

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

The operating pressure ranges from 3 to 8 bar.

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

Base “UNLIMITED“

The base type UNLIMITED has a rotatable distribution plate with 4 positions, allowing direct connection without installation components and is suitable for ACTAIR/DYNACTAIR (old generation), ACTAIR/DYNACTAIR NG(V) and ACTAIR/DYNACTAIR EVO(E).

This new robust base type UNLIMITED and its actuating shaft are made from die-cast aluminium. The captive screws facilitate installation and maintenance.

This unique base provides ports for either direct control air or external control air connection.

Direct control air connection

The base type UNLIMITED can be fitted to ACTAIR and DYNACTAIR actuators (all generations) without the need for a bracket and external piping

This mounting method is compatible with the following products:
- ACTAIR EVO 2 to 160
- DYNACTAIR EVO 1 to 80
- ACTAIR NG 2 to 160
- DYNACTAIR NG 1 to 80
- ACTAIR 3 to 200
- DYNACTAIR 1.5 to 100

A VDI/VDE 3845 interface eliminates the need for external piping and saves space.

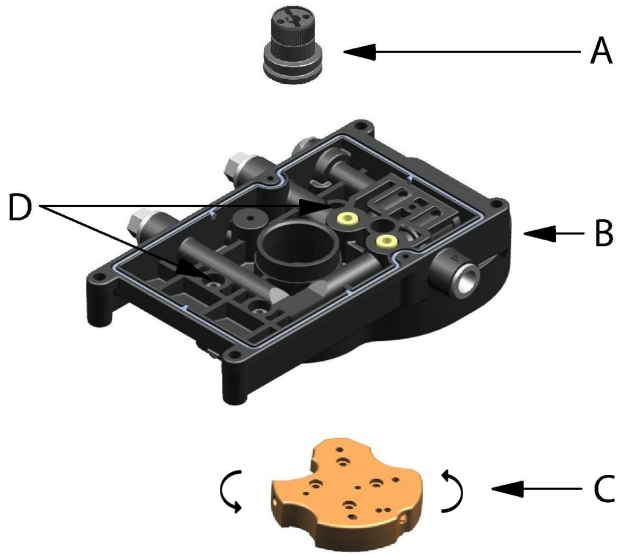

Fig. 2: Base UNLIMITED

A: Actuating shaft made of aluminium
B: Base made of aluminium
C: Rotatable distribution plate with 4 positions + 4 sealing elements
D: Mounting via VDI/VDE 3845 interface

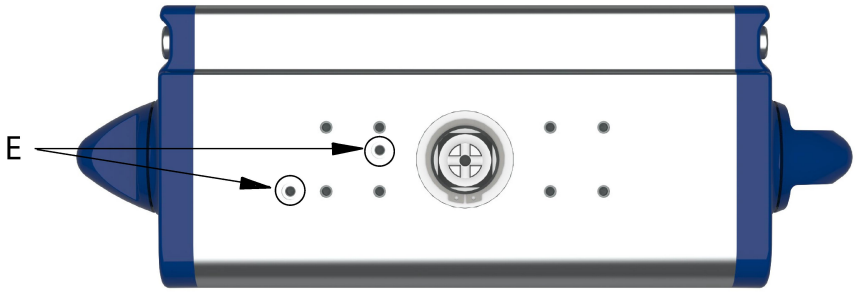

Fig. 3: Top view of ACTAIR EVO

E: Ports for direct control air supply (KSB system)

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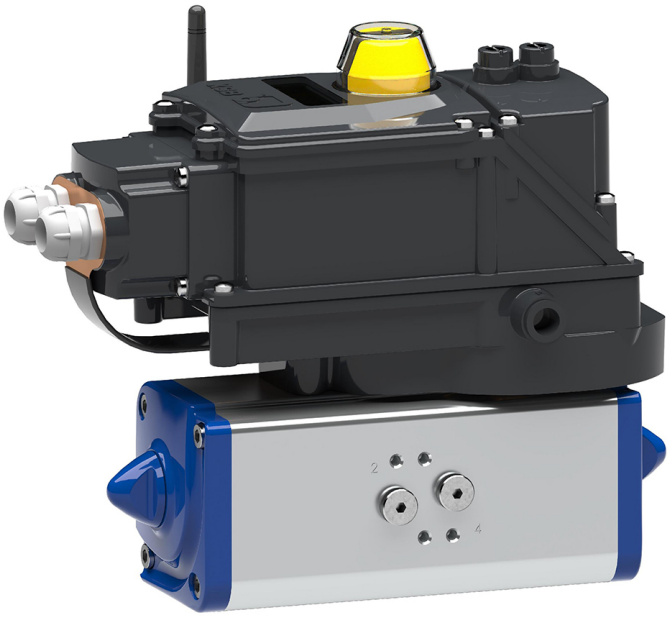

Fig. 4: SMARTRONIC U PC mounted on ACTAIR EVO

Control air connection with piping

The base type UNLIMITED allows positioners to be mounted on ACTAIR/DYNACTAIR actuators (all generations) with piping. This mounting option is used for actuators which do not have control air connections compatible with the VDI/VDE 3845 interface.

This mounting method is compatible with the following products:
- ACTAIR EVO 240 to 700
- DYNACTAIR EVO 120 to 350
- ACTAIR 400 to 1600
- DYNACTAIR 200 to 800
- ACTAIR NG 240 to 700
- DYNACTAIR NG 120 to 350
- Actuator with VDI/VDE 3845 interface

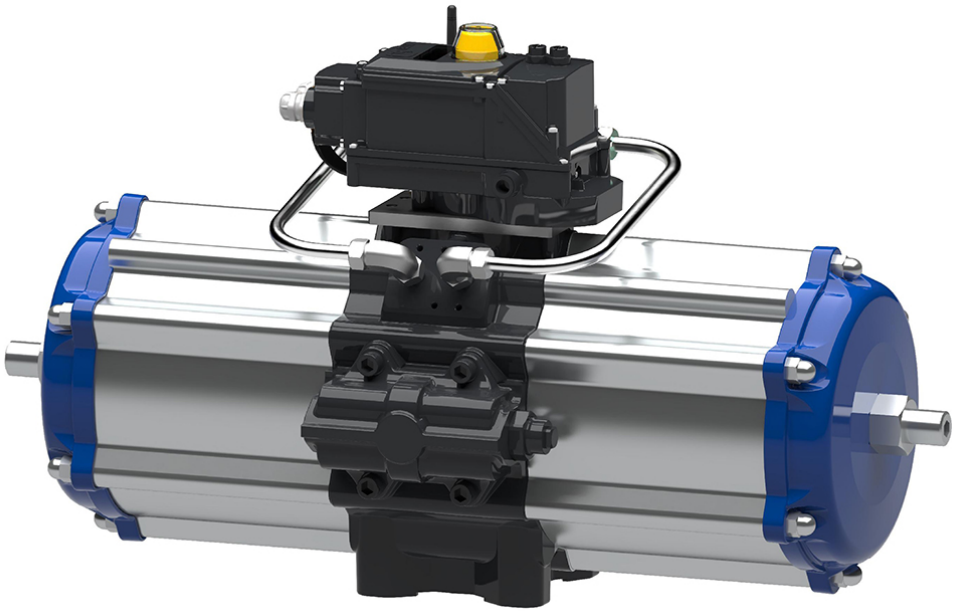

Fig. 5: SMARTRONIC U PC mounted on ACTAIR EVO 340

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Programmable curves for opening/closing

- Actuation is triggered by a volt-free digital switch (PLC).
- The user 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 U PC allows the implementation of monitoring and safety functions.
- The user defines an upper and a lower limit for this external signal (4 - 20 mA signal) and thus the associated “at rest” position.

Control

- A PID control algorithm allows the control of a physical quantity measured and transmitted by an external signal source which is connected directly to SMARTRONIC U PC.
- This external 4 - 20 mA signal source can be supplied with 24 V voltage by the control unit.
- The control unit allows the selection of SMARTRONIC U 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 provides a control setpoint.
  - Example: 400 m3/h, if the flow rate is measured at the external signal source input
  - **manual mode,** it is used a positioner.
    The external setpoint input (4 - 20 mA signal or Profibus) provides a position setpoint.
  - Example: Valve opening angle is 45°
- The emergency control device ensures that the valve is closed automatically.

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 U 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 tank.
- Alongside classic control functions, SMARTRONIC U PC features specific control algorithms which allow the water level in filters to be controlled.

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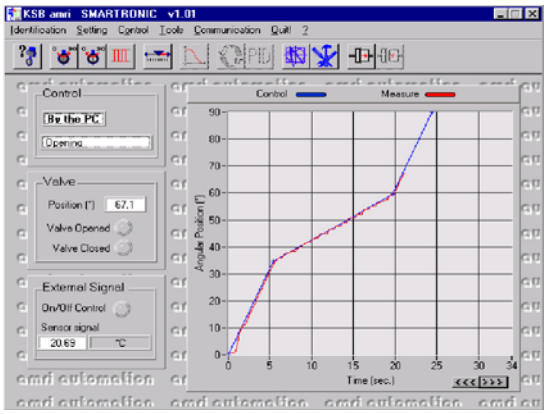
User interface

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



Profibus DP

Table 3: Characteristics

SMARTRONIC U PC Profibus DP meets the requirements of the EN 50170 and DIN 19245 Profibus standards.			
Selection	SMARTRONIC U PC Profibus DP is suitable for use with all pneumatic actuators from the ACTAIR EVO and DYNACTAIR EVO type series.		
Topology	Bus, tree with repeater option		
Medium	Twisted-pair cable, 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 U PC		
Control bus variables	6 input bytes 6 output bytes		
Bus terminator	Each slave component of SMARTRONIC U PC Profibus DP has a terminating resistor 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 U PC materials

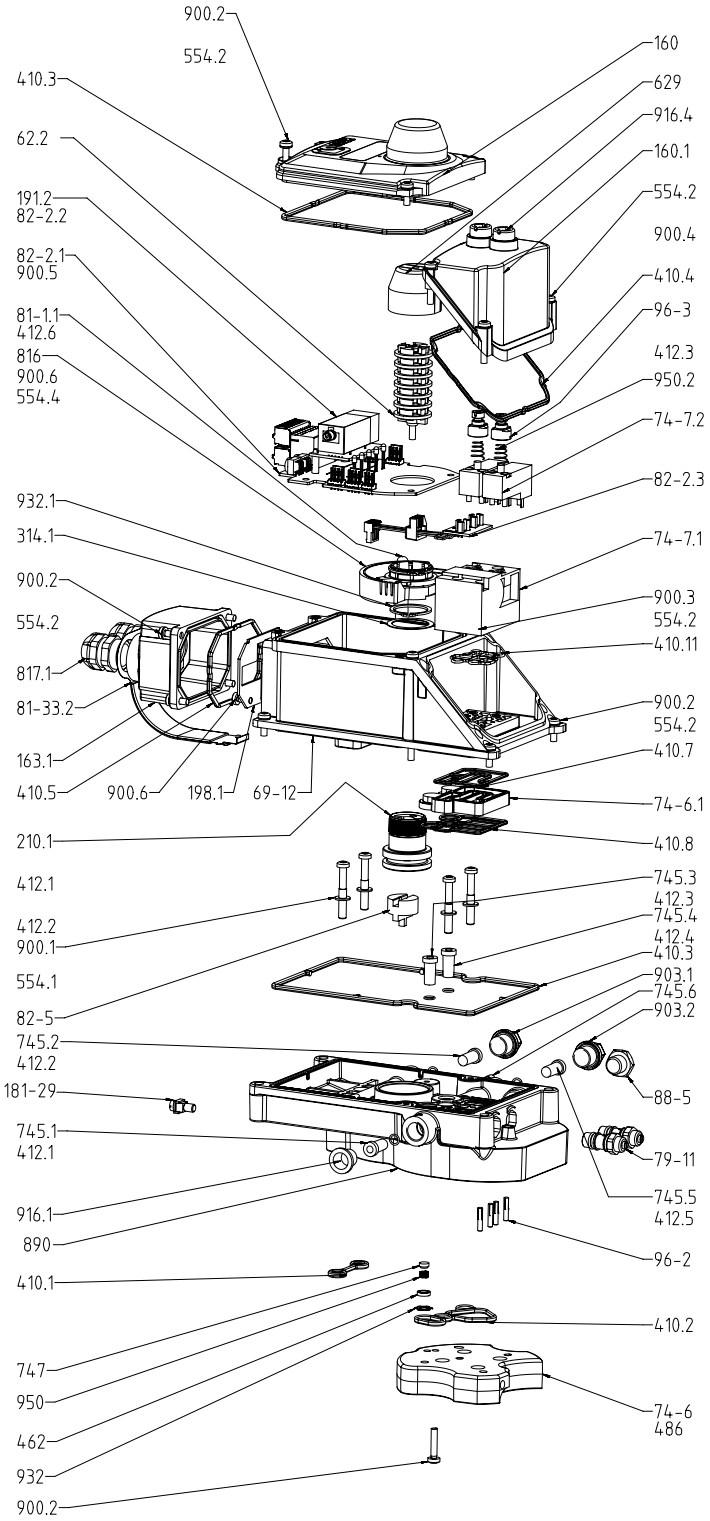

Fig. 6: Exploded view of A1312

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	Bonnet	Polycarbonate with 20 % glass fibre
181-29	Earth terminal	Steel
191.2	Spacer, PCB	Polyamide
198.1	Connection plate	Polyamide
210.1	Actuating shaft	Aluminium alloy
314.1	Anti-friction disc	Stainless steel, type 304L
410.1	Profile seal	NBR80
410.2	Profile seal	NBR80
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
412.4	O-ring	NBR70
412.5	O-ring	NBR70
412.6	O-ring	NBR70
462	Bearing disc	Polyamide
486	Ball	Steel
554.1	Washer	Stainless steel
554.2	Washer	Stainless steel
554.4	Serrated lock washer	Steel
629	Position indicator assembly	
62-2	Adjustable cam assembly	
69-12	Housing	Polycarbonate with 20 % glass fibre
745.1	Sintered filter	Bronze
745.2	Sintered filter	Bronze
745.3	Sintered filter	Bronze
745.4	Sintered filter	Bronze
745.5	Sintered filter	Bronze
745.6	Sintered filter	Bronze
74.6	Distribution plate	
74-6.1	Distribution plate A/B	
74-7.1	Directional control valve	
74-7.2	Pilot valve	
747	Profile seal	
79-11	Flow reducer RP 1/8"	
816-1.1	Plug connector / aerial assembly	
81-1.1	Plug connector assembly	
81-33.2	Metal sheet assembly for connection to earth	
816	Angle sensor assembly	
817.1	Plug	Polyamide
82-2.1	Printed circuit board	
82-2.2	Communication card assembly	
82-2.3	Actual-position feedback	
82.5	Adapter, shaft	Thermoplastic
88-5	Silencer 1/4'' BSP	Bronze
890	Base	Aluminium alloy
96-2	Locking plate	Polycarbonate
96-3	Emergency control	Polycarbonate
900.1	Bolt/screw	A2-70
900.2	Hexagon socket head cap screw	A2-70
900.3	Hexagon socket head cap screw	A2-70

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Part No.	Description	Materials
900.4	Hexagon socket head cap screw	A2-70
900.5	Hexagon socket head cap screw	A2-70
900.6	Self-tapping screw	A2-80
903.1	Plug	Polyamide
903.2	Plug	Polyamide
916.1	Screw plug	Polyamide
916.4	Elastomer string	Nitrile
932	Reinforced circlip	Steel
932.1	Circlip	Steel
950	Spring	Stainless steel
950.2	Manual override spring	Stainless steel
970.1	Sticker	Adhesive polyester

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Variants

Adaptation for mounting on linear actuators to NAMUR

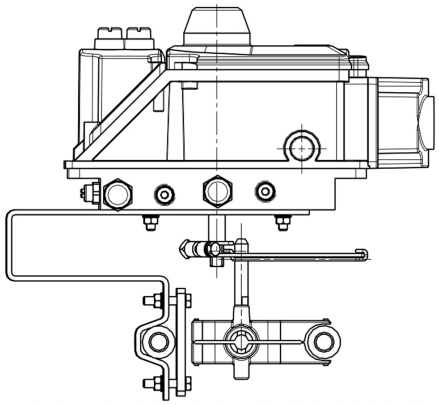

Fig. 7: Front view

Dimensions

SMARTRONIC U PC dimensions

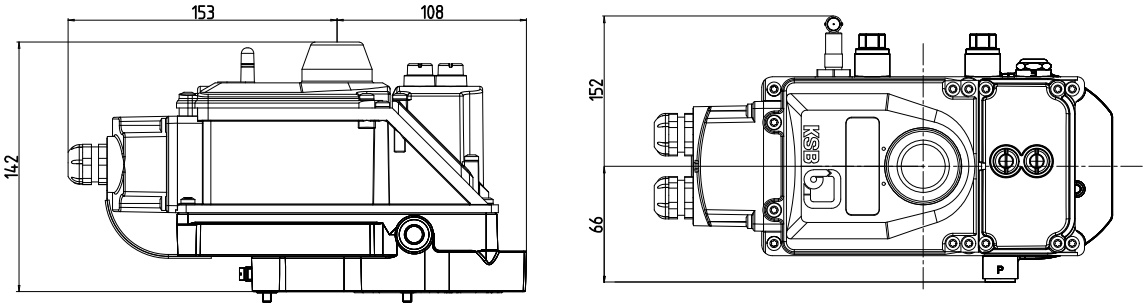

Fig. 8: SMARTRONIC U PC / type A1312 dimensions

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Purchase order specifications

Table 5: Type code for SMARTRONIC U PC A1312

SMARTRONIC U PC	A001312	0	0	0	0	0	4	.	R	7	.	.	.	.	0	6	.	.	.
Sensors																			
Auto-calibrating		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, metal, M20, IP67 (diameter: 6 to 12)								2											
Directional control valve																			
4/3 centre closed									R										
Voltage, directional control 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								
ACTELEC 400 to 1600											4								
DYNACTAIR 1.5 to 25, Fail Closed in the event of control air failure											6								
DYNACTAIR 1.5 to 25, Fail Open in the event of control air failure											7								
DYNACTAIR 50 to 100, Fail Closed in the event of control air failure											8								
DYNACTAIR 50 to 100, Fail Open in the event of control air failure											9								
DYNACTAIR 200 to 800, Fail Closed in the event of control air failure											J								
DYNACTAIR 200 to 800, Fail Open in the event of control air failure											K								
ACTAIR NG / EVO 2											A								
ACTAIR NG / EVO 5 - 20											B								
ACTAIR NG / EVO 30 - 160											C								
ACTAIR NG / EVO 240 - 700											D								
DYNACTAIR EVO 1, Fail Closed in the event of control air failure											E								
DYNACTAIR EVO 2 - 8, Fail Closed in the event of control air failure											F								
DYNACTAIR EVO 12 - 80, Fail Closed in the event of control air failure											G								
DYNACTAIR EVO 120 - 350, Fail Closed in the event of control air failure											H								
DYNACTAIR EVO 1, Fail Open in the event of control air failure											P								
DYNACTAIR EVO 2 - 8, Fail Open in the event of control air failure											Q								
DYNACTAIR EVO 12 - 80, Fail Open in the event of control air failure											R								
DYNACTAIR EVO 120 - 350, Fail Open in the event of control air failure											S								
ACTAIR / DYNACTAIR (all sizes and generations) + external connection											T								
Double-acting pneumatic quarter-turn actuators											W								
Single-acting pneumatic quarter-turn actuators											X								
Pneumatic linear actuator, double-acting											Y								
Pneumatic linear actuator, single-acting											Z								

SMARTRONIC U PC	A001312	0	0	0	0	0	4	.	R	7	.	.	.	.	0	6	.	.	.
Fail-safe position																			
Fail Closed in the event of power failure												**A**							
Fail Open in the event of power failure												**B**							
Fail-in-last-position in the event of power failure												**C**							
SMARTRONIC U																			
Programmable curves for opening/closing													**1**						
Intelligent positioner													**2**						
Monitoring external sensor													**3**						
Control													**4**						
Filter tank level control													**5**						
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**	
Protection against accumulation of water																			
None																			**0**
Yes																			**1**

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KSB S.A.S.
4, allée des Barbanniers • 92635 Gennevilliers Cedex (France)
Tél. 09 69 39 29 79
www.ksb.com/fr-fr