SIEMENS

OpenAir™

Air damper actuators

GBB..1E

Electronic rotary actuators for 2-position, 3-position, and modulating control

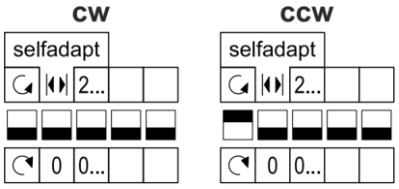
- Nominal torque 25 Nm
- Operating voltage : AC 24 V ~ / DC 24 V ⎓ or AC 100...240 V ~
- Mechanically adjustable span between 0. 90°
- Pre-wired with standard 0.9 m connection cables
- Type-specific variations with adjustable offset and span for the positioning signal
- Position indication: Mechanical and electrical
- Feedback potentiometer
- Self-adaption of the rotation angle range and adjustable auxiliary switches for supplemental functions

Application

Rotary actuators are used in ventilation and air conditioning plants to regulate and shut off air dampers:

- For damper areas up to ca. 5 m^2 (Reference value; comply with data from the damper manufacturer).
- Suitable for use with 2-position and 3-position controllers as well as modulating controllers (DC 0/2...10 V) to control air dampers.
- We recommend a minimum pulse length of 500 ms on rotary actuators operated with 3-point control to ensure continuous and accurate operation.

Functions

GBB..	AC 24 V ~ / DC 24 V ⎓	**141.1E / 145.1E / 146.1E**	**161.1E / 163.1E / 164.1E / 166.1E**
	AC 100...240 V ~	**341.1E / 345.1E / 346.1E**	**-**
Control type		2-position/3-position	Modulating control (0/2…10 V)
Rotary movement, rotation direction		Clockwise or counterclockwise direction depends …	
		• … on the type of control.	• … on the setting on the DIL switch clockwise / counterclockwise;  • … on the positioning signal.
		The actuator remains in the respective position with no power applied.	The actuator remains in the deployed position: • … if the positioning signal is maintained at a constant value; • …in the event of power loss
Position indication	mechanical	Rotation angle position indication using a position indicator.	
	electrical	-	Position indicator: Output voltage U = DC 0/2…10 V is generated proportional to rotation angle. The rotation direction (inverted or non-inverted) for output voltage U is based on the DIL switch position.
Auxiliary switch		The switching points for auxiliary switches A and B can be set independently in increments of 5° from 0 to 90°.	
Self adaptation of Rotation range		-	The actuator automatically determines the mechanical end positions of the rotation angle range. The characteristic function (Uo, ΔU) is mapped to the calculated rotation angle range. Power must be connected to DIL switch 2 (self-adaptation) for the function to operate.
Manual adjustment		The actuator can be manually adjusted by pressing the gear train disengagement button.	
Rotation angle limitation		The rotation angle of the shaft adapter can be limited mechanically to 5° increments.	

Technical design

Housing

- Robust and light cast aluminum housing. The housing guarantees long life, even under challenging ambient conditions.

Actuator / gears

- Brushless, robust DC motors ensure reliable operation regardless of load. The valve actuators do not require an end position switch, are overload proof, and remain in place upon reaching the end stop.
- The gears are maintenance free and low noise.

Type summary

Type	Stock number	Open-loop control	Operating voltage	Positioning signal input Y	Position indicator U = DC 0. 10 V ⎓	Feedback potentiometer 5 kΩ	Self-adapting rotation angle range	Auxiliary switch	Rotation direction switch
GBB141.1E	S55499-D813	2 or 3-position	AC 24 V ~ / 24 V ⎓	-	No	No	No	0	No
GBB145.1E	S55499-D814					Yes		2	
GBB146.1E	S55499-D815					No			
GBB341.1E	S55499-D820		AC 100...240 V ~					0	
GBB345.1E	S55499-D821					Yes		2	
GBB346.1E	S55499-D822					No			
GBB161.1E	S55499-D816	Modulating	AC 24 V ~ / DC 24 V ⎓	DC 0/2...10 V ⎓	Yes	No	Yes	0	Yes
GBB163.1E	S55499-D817			DC 0...35 V ⎓					
GBB164.1E	S55499-D818							2	
GBB166.1E	S55499-D819			DC 0/2...10 V ⎓					

Accessories / spare parts

See data sheet N4699.

Product documentation

Topic	Title	Document ID
Data sheet	Air damper actuators	A6V14252663
Technical principles	Rotary actuators without spring return GBB/GIB..1	Z4626
Mounting instructions	Rotary-type actuator GBB..1E, GIB..1E	A6V14196968
Datenblatt	Accessories and spare parts for air damper actuators - ASC.., ASK..	N4699

Related documents such as environmental declarations, CE declarations, etc., can be downloaded at the following Internet address:

http://siemens.com/bt/download

Notes

Safety

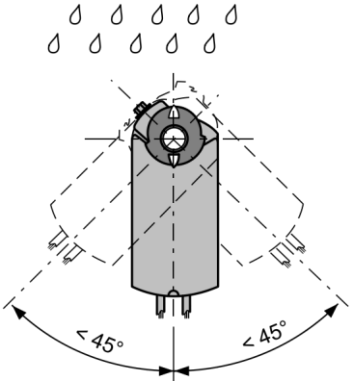
⚠ CAUTION	
	**National safety regulations** Failure to comply with national safety regulations may result in personal injury and property damage. ● Observe national provisions and comply with the appropriate safety regulations. ● Mounting, commissioning, and service by properly trained personnel only.

Engineering

Auxiliary switch and potentiometer

Cannot be integrated after the fact.

Mounting



See A6V14196968.

Shaft connection

Comply with the specifications on shaft diameter and damper surface area during installation (Application [▶ 2], Technical data [▶ 8]) and use only industry-standard quality materials for damper shafts.

Installation

⚠ WARNING	
	**No internal line protection for supply lines to external consumers** Risk of fire and injury due to short-circuits! ● Adapt the wire cross sections as per local regulations to the rated value of the installed fuse.

Maintenance

Actuators GBB..1E are maintenance free.

Disposal

This symbol or any other national label indicate that the product, its packaging, and, where applicable, any batteries may not be disposed of as domestic waste. Delete all personal data and dispose of the item(s) at separate collection and recycling facilities in accordance with local and national legislation.
For additional details, refer to Siemens information on disposal.

Technical data

Power (GBB1..1E)			
Operating voltage (SELV/PELV)			AC 24 V ~ ± 20 % (19,2...28,8 V ~) DC 24 V ⎓ ± 20 % (19.2...28.8 V ⎓) [1)]
Frequency			50/60 Hz
Power consumption	Operation	GBB14..1E	2.1 VA / 1.4 W
		GBB16..1E	2.2 VA / 1.5 W
	Hold	GBB14..1E	0.8 VA / 0.5 W
		GBB16..1E	0.9 VA / 0.5 W

Power (GBB3..1E)			
Operating voltage (SELV/PELV)			AC 100...240 V ~ ± 10 % (90...264 V ~)
Frequency			50/60 Hz
Power consumption	Operation	GBB34..1E	3.5 VA / 2,0 W
	Hold	GBB34..1E	1.5 VA / 1.0 W

Operating data		
Torque	Nominal	25 Nm
	Maximum (blocked)	38 Nm [2)]
	Minimum (hold state)	25 Nm
Rotation angle	Nominal (with position indicator)	90°
	Maximum (mechanically limited)	95° ± 2°
Runtime at nominal rotation angle 90°		150 s
Actuator sound power level (at a positioning time of 150 s)		<45 dB(A)

Inputs			
Positioning signal for GBB14..1E	Operating voltage AC 24 V ~ / DC 24 V ⎓	(wires 1-6/G-Y1)	Clockwise
		(wires 1-7/G-Y2)	Counterclockwise
Positioning signal for GBB34..1E	Operating voltage AC 100...240 V ~	(wires 4-6/N-Y1)	Clockwise
		(wires 4-7/N-Y2)	Counterclockwise
Positioning signal for GBB16..1E	Input voltage	(wires 8-2/Y-G0)	DC 0/2...10 V ⎓
	Power consumption		0.1mA
	Input resistance		≥100 kΩ
Max. permissible input voltage			DC 35 V ⎓ limited internally to DC 10 V ⎓
	Protected against incorrect wiring		Max. AC 24 V ~ / DC 24 V ⎓
Hysteresis	for non-adjustable characteristic function		60 mV
	for adjustable characteristic function		0.6 % of ΔU
Adjustable characteristic function (GBB163.1E, GBB164.1E)			
	Adjustable with 2 potentiometers	Offset Uo	DC 0...5 V ⎓
		Workspace ΔU	DC 2...30 V ⎓
	Max. input voltage		DC 35 V ⎓
	Protected against incorrect wiring		Max. AC 24 V ~ / DC 24 V ⎓

Outputs			
Position indicator	Output signal GBB16..1E	(Wires 9-2/Y-G0)	
	Output voltage U		DC 0...10 V ⎓
	Max. output current		DC ± 1 mA
	Protected against incorrect wiring		Max. AC 24 V ~/ DC 24 V ⎓
Feedback potentiometer (for GBB145.1E, GBB345.1E)	Change in resistance	(wires P1-P2)	0...5000 Ω
	Load		<0.25 W
	Max. sliding contact current		<0.1 mA
	Permissible voltage at potentiometer (SELV/PELV)		AC 24 V ~ / DC 24 V ⎓
	Insulation resistance between potentiometer and housing		AC 500 V ~

Mechanical life	
Full cycles	60'000
Partial cycles	5'000'000

Auxiliary switches (GBB146.1E, GBB164.1E, GBB166.1E, GBB346.1E)		
Switching voltage		AC 24...250 V ~ / DC 12...30 V ⎓
Contact loading		6 A resistive, 2 A inductive, min. 10 mA @ AC 4 A resistive, 2 A inductive, min. 10 mA @ DC 30 V ⎓ 0.8 A resistive, 0.5 A inductive, min. 10 mA @ DC 60 V ⎓
Electric strength auxiliary switch against housing		AC 4 kV
Switching range for auxiliary switches / setting increments		5...90° / 5°
Factory switch setting:	Switch A	5°
	Switch B	85°

Connection cable	
Cable length	0.9 m
Cable cross-section	0.75 mm^2
Permissible length for signal wires	300 m

Safety class and degree of protection		
Protection class		EN 60730
	AC 24 V ~ / DC 24 V ⎓, Feedback potentiometer	III
	AC 100...240 V ~, auxiliary switch	II
Degree of protection of housing		IP54 as per EN 60529 (see Mounting [▶ 4] and A6V14196968)

Environmental conditions		
Operation		IEC 60721-3-3
	Climatic conditions	Class 3K23
	Mounting location	Interior, weather-protected
	Temperature	-32...55 °C
	Humidity, non-condensing	<95 % r.h.
Transportation		IEC 60721-3-2
	Climatic conditions	Class 2K12
	Temperature	-32...70 °C
	Humidity, non-condensing	<95 % r.h.
Storage		IEC 60721-3-1
	Climatic conditions	Class 1K22
	Temperature	-32...50 °C
	Humidity, non-condensing	<95 % r.h.
Mechanical conditions		IEC 60721-3-2 / class 2M4

Standards, directives and approvals	
Product standards	EN60730 Part 2-14: Particular requirements for electric actuators
Electromagnetic compatibility (field of use)	For residential, commercial, and industrial environments
EU conformity (CE)	A5W00004366 [3]
RCM conformity	A5W00004367 [3]
EAC compliance	Eurasian conformity
UKCA conformity	A5W00198137A [3]
UL approbation Federal Communications Commission	UL as per 60730 http://ul.com/databse cUL as per CSA-C22.2 No. 24-93

Environmental compatibility
Environmental Declaration A5W00712474A [3] contains data on environmental-compatible product design and assessment (RoHS compliance, compositions, packaging, environmental benefits and disposal).

Dimensions		
Actuator (W x H x D)		See Dimensions [▶ 11]
Damper shaft	Round	8...25.6 mm
	Square (diagonal)	6...18 mm
	Min. length	20 mm
	Max. shaft hardness	<300 HV

Weight		
Without packaging	Excluding auxiliary switch	Max. 2.2 kg
	Including auxiliary switch	Max. 2.35 kg

[1] cUL: Only to DC 30 V ⎓ Permissible

[2] See notes under Application [▶ 2] and below (Technical data [▶ 8]).

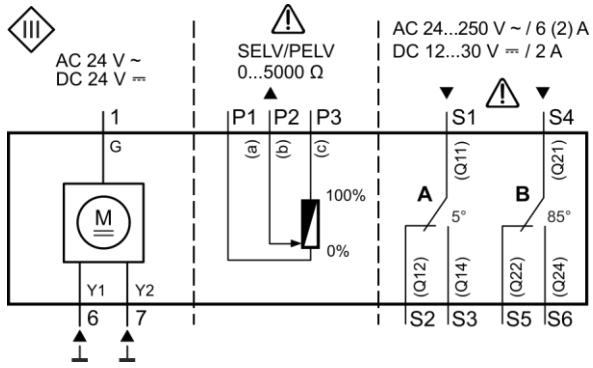
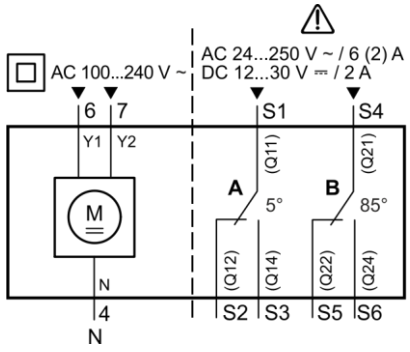
[3] The documents can be downloaded at http://siemens.com/bt/download.

NOTICE	
!	**Shaft connection – Important notes for the manufacturer / installer** Use of unsuitable damper shafts may damage the damper or damper shaft. ● Use only damper shafts with diameters suitable for the damper surface. ● Use only quality materials typical for the sector for damper shafts/rods.

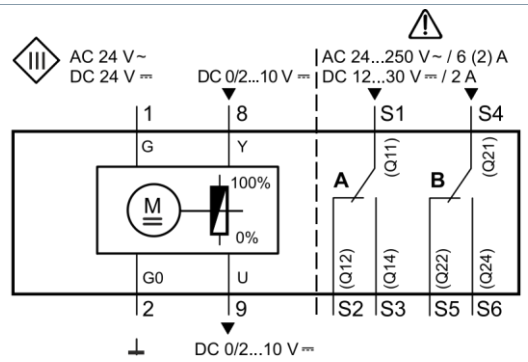
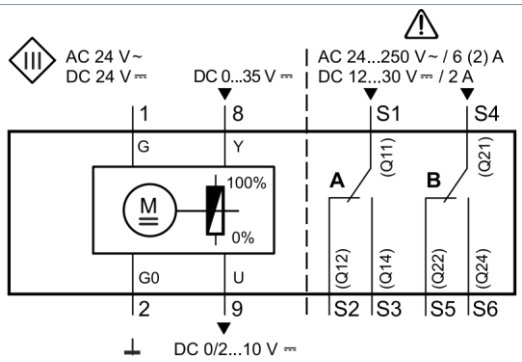
Connection diagrams

Internal diagrams

Open / close, 3-position control

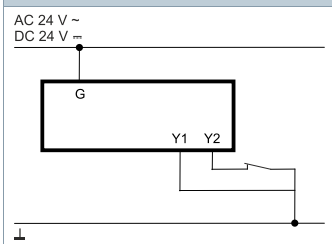
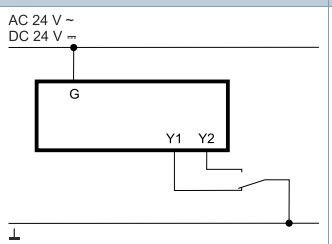
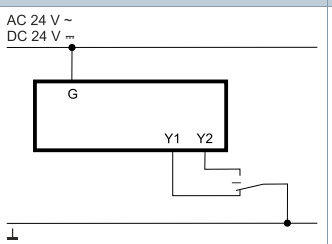
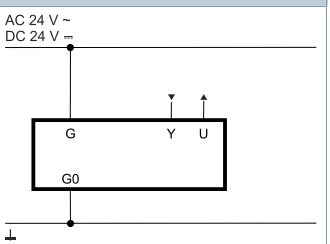
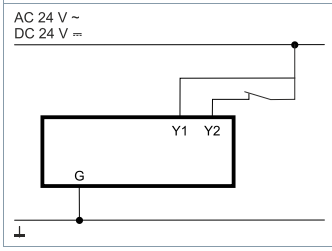
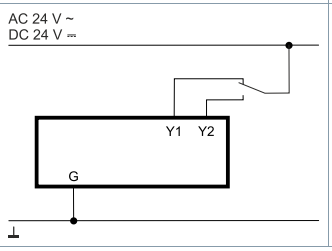
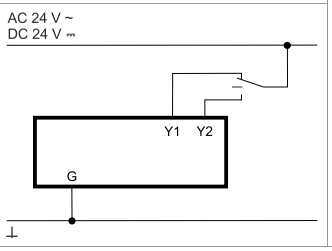
GBB14..1E	GBB34..1E
AC 24 V ~ / DC 24 V ⎓	AC 100...240 V ~
	

Modulating control

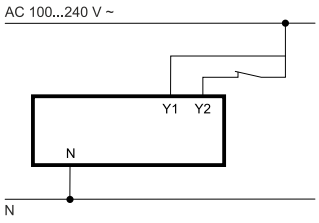
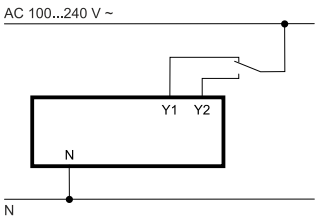
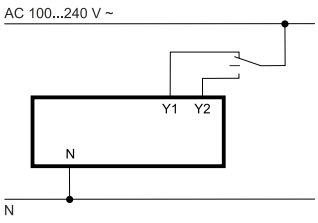
GBB16..1E Y = DC 0/2...10 V ⎓	GBB16..1E Y = DC 0...35 V ⎓
AC 24 V ~ / DC 24 V ⎓	
	

Connection diagrams

Control on GBB1..1E (AC 24 V ~ / DC 24 V ⎓)

Open-close, single wire control Single pole on/off switch (SPST)	Open / close, two-wire control Single pole double throw (SPDT)	3-position control	Modulating control
			
			

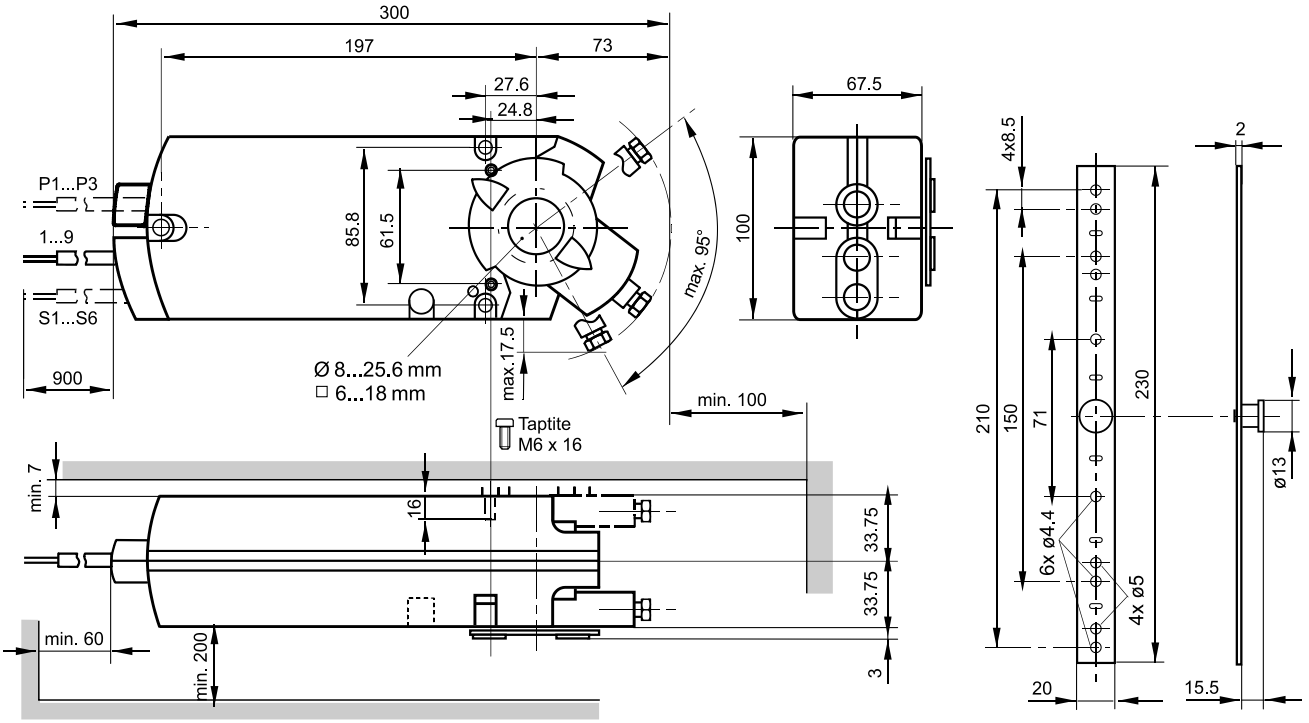
Open / closed, two-wire control on GBB3..1E (AC 100...240 V ~)

Open-close, single wire control Single pole on/off switch (SPST)	**Open / close, two-wire control** Single pole double throw (SPDT)	**3-position control**	
			

Cable designations

Pin	Code	No.	Color	Abbreviation	Meaning
Actuators AC 24 V ~ / DC 24 V ⎓	G	1	red	RD	System potential AC 24 V ~ / DC 24 V ⎓
	G0	2	Black	BK	System neutral
	Y1	6	violet	VT	Positioning signal AC/DC 0 V" clockwise"GBB14..1E)
	Y2	7	orange	OG	Positioning signal AC/DC 0 V "counterclockwise" GBB14..1E)
	Y	8	gray	GY	Signal input (GBB16..1E)
	U	9	pink	PK	Signal output (GBB16..1E)
Actuators AC 100...240 V ~	L	3	brown	BR	Phase AC 100...240 V ~
	N	4	light blue	BU	Neutral conductor
	Y1	6	Black	BK	Positioning signal AC 100...240 V ~ "clockwise"
	Y2	7	white	WH	Positioning signal AC 100...240 V ~ "counterclockwise"
Feedback potentiometer	a	P1	white/red	WH RD	Potentiometer 0…100 % (P1-P2)
	b	P2	white/blue	WH BU	Potentiometer pick-off
	c	P3	white/pink	WH PK	Potentiometer 100…0 % (P3-P2)
Auxiliary switch	Q11	S1	gray/red	GY RD	Switch A input
	Q12	S2	gray/blue	GY BU	Switch A Normally closed contact
	Q14	S3	gray/pink	GY PK	Switch A Normally open contact
	Q21	S4	black/red	BK RD	Switch B input
	Q22	S5	black/blue	BK BU	Switch B Normally closed contact
	Q24	S6	black/pink	BK PK	Switch B Normally open contact

Dimensions



Dimensions in mm

Revision numbers

Type	Valid from rev. no.	Type	Valid from rev. no.
GBB141.1E S55499-D813	..A	GBB164.1E S55499-D818	..A
GBB145.1E S55499-D814	..A	GBB166.1E S55499-D819	..A
GBB146.1E S55499-D815	..A	GBB341.1E S55499-D820	..A
GBB161.1E S55499-D816	..A	GBB345.1E S55499-D821	..A
GBB163.1E S55499-D817	..A	GBB346.1E S55499-D822	..A

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