SIEMENS

ACVATIX™

Rotary actuators for 6-port ball valves
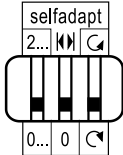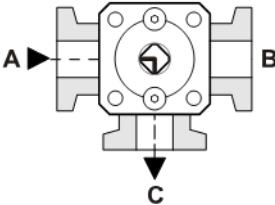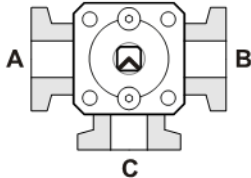
GDB161.9../..6..

(*optional
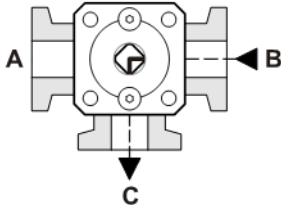
Electromotoric rotary actuators for modulating or Modbus control. Used in heating, ventilation and air conditioning plants.

- Nominal torque 5 Nm
- For VWG4.. series 6-port control ball valves
    - GDB161.9../6W
    - GDB161.9E/MO6P
- For VWPG51.. series 6-port pressure independent control ball valves (PICVs)
    - GDB161.9../6W (when manual pre-setting is not desired)
    - GDB161.9../6P
    - GDB161.9E/MO6P
- Specific firmware for 6-port application
- Pre-setting of cooling and heating max. flows through manual operation with screws:
    - GDB161.9../6P
- Pre-wired with 0.9 m, 3 m or 5 m long connection cables

Features

- Brushless, robust DC motors ensure reliable operation regardless of load.
- The rotary 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.
- Suitable for use with modulating controllers (DC 0/2…10 V) and Modbus RTU controllers.

Functions

Type	AC 24 V ~ / DC 24…48 V =	GDB161.9../6W	GDB161.9../6P	—
	AC 24 V ~ / DC 24 V =	—	—	GDB161.9E/MO6P
Control type		Modulating control (0/2…10 V)		Modbus RTU
Rotary direction		Clockwise (CW) or counter-clockwise (CCW) direction depends on: - the setting of the rotary direction DIP switch - the positioning signal The actuator remains in the achieved position if: - … the control signal is maintained at a constant value. - … the operating voltage is lost.		Configurable through Modbus registers Cf. "Modbus registers [▶ 13]"
Combination with 6-port control ball valves		**Rotary direction "counter-clockwise" (CCW)**		
		Y = 0 (2) V Flow A – C = 100 % (0°) Y = 10 V Flow B – C = 100 % (90°)		Configurable through Modbus registers Cf. "Modbus registers [▶ 13]"
		Rotary direction "clockwise" (CW)		
		Y = 0 (2) V Flow B – C = 100 % (0°) Y = 10 V Flow A – C = 100 % (90°)		Configurable through Modbus registers Cf. "Modbus registers [▶ 13]"
Position indication	Mechanical	Rotary angle position indication by a position indicator/hand lever.		
	Electrical	Output voltage U = DC 0/2…10 V is generated proportional to the rotary angle. U depends on the rotary direction of the DIP switch setting.		Actual value 0…100 % for valve position Cf. "Modbus registers [▶ 13]"
Cooling and heating maximum flows presetting		Not available - VWG4.. series 6-port control ball valves are delivered with kvs disks.	Manual flow pre-setting with 2 screws on the actuator.	Configurable through Modbus registers Cf. "Modbus registers [▶ 13]"

Type	AC 24 V ~ / DC 24…48 V =	GDB161.9../6W	GDB161.9../6P	—
	AC 24 V ~ / DC 24 V =	—	—	GDB161.9E/MO6P
Maximum flows and self-adaption		-	Total rotation angle is determined by the actuator through self-calibration triggered via DIP switch after manual pre-setting with screws. Dead band zone (no flow) is fixed and not influenced by the new adjusted positions.	Configurable through Modbus registers Cf. "Modbus registers [▶ 13]"
Manual override		A push button disengages the internal gears letting the actuator to be manually adjusted or overridden.		
Backup function		Actuator drives the valve to the closed position (45°) for open Y signal input (0 V) when 2…10 V control mode is selected.		Actuator drives the valve to a pre-defined backup position through Modbus registers Cf. "Parametrization [▶ 7]"
Modbus RTU (RS-485), not galvanically isolated		-	-	Setpoint 0...100 % valve position Actual value 0...100 % for valve position Override control Setpoint monitoring and backup mode

Technical design

Housing
The housing is made of fiberglass reinforced plastic:
- Flame retardant
- Non-brominated
- Non-chlorinated

Type summary

Type	Stock no.	Positioning signal	Operating voltage	Position indicator	Rotation direction switch	Cable length
GDB161.9E/6W	S55499-D784	Modulating	AC 24 V ~ / DC 24…48 V =	U = DC 0…10 V =	DIP switch	0.9 m
GDB161.9E/6P	S55499-D801					
GDB161.9E/MO6P	S55499-D802	Modbus RTU	AC 24 V ~ / DC 24 V =	Modbus register 0…100 %	Modbus register	
GDB161.9G/6W	S55499-D829	Modulating	AC 24 V ~ / DC 24…48 V =	U = DC 0…10 V =	DIP switch	3 m
GDB161.9G/6P	S55499-D827					
GDB161.9H/6W	S55499-D830					5 m
GDB161.9H/6P	S55499-D828					
GDB161.9H/6W100	S55499-D925					10 m
GDB161.9H/6P100	S55499-D926					

Accessories / Spare parts

Spare parts

Individual spare parts are not available. Components of the accessory kit ASK77.3 [1] can however be used for spare parts.

Description	Components
ASK77.3 Mounting kit BV for GxBxx1.9E	Mounting bracket (base plate) Axle with sleeve and spring Manual lever with locking clip

[1] Can also be used as rotary actuator for ball valves together with the actuator for air dampers G..B.1E.

Equipment combinations

GDB161.9../6W, GDB161.9E/MO6P and VWG4.. series 6-port control ball valves PN16

Medium: 5...90 °C	Connection	k_{vs} [m³/h]	DN	Δp_{max}[kPa] [1]
VWG41.10..	G ½ " B	0.25...1.9	10	
VWG41.20..	G 1 " B	0.25...4.25	20	200
VWG42.10..	G ½ " B	0.25…1.95	10	

GDB161.9../6W, GDB161.9../6P, GDB161.9E/MO6P and VWPG51.. series 6-port pressure independent control ball valves PN25

Medium: 5...90 °C	Connection	Flow [l/h]	DN	Δp_{max}[kPa] [1]
VWPG51.15..	G ¾ "	35...1200	15	
VWPG51.20..	G 1 "	460...4250	20	400

[1] Δp_{max} = Maximum permissible differential pressure over the ball valve control path, valid for the entire positioning range of the ball valve rotary actuator unit

Product documentation

Topic	Title	Document ID
Data sheet: Technical information	6-port control ball valve VWG41..	A6V10564480
Data sheet: Technical information	6-port compact control ball-valve VWG42.10..	A6V14034341
Data sheet: Technical information	6-port pressure independent control ball valve (PICV) VWPG51..	A6V12815016

Topic	Title	Document ID
Mounting	Mounting instructions 6-port control ball valve VWG41..	A6V10564501
Mounting	Mounting instructions 6-port compact control ball-valve VWG42.10..	A5W00340833
Mounting	Mounting instructions 6-port pressure independent control ball valve (PICV) VWPG51..	A6V12814982
Mounting	Mounting instructions rotary-type actuator GDB161.9E/..6..	A6V12815008

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

Engineering

GDB161.9../..6.. actuators are recommended for use at medium temperatures > 0 °C.

If the medium temperature is ≤ 0 °C, the adapter shaft must be greased with silicon grease.
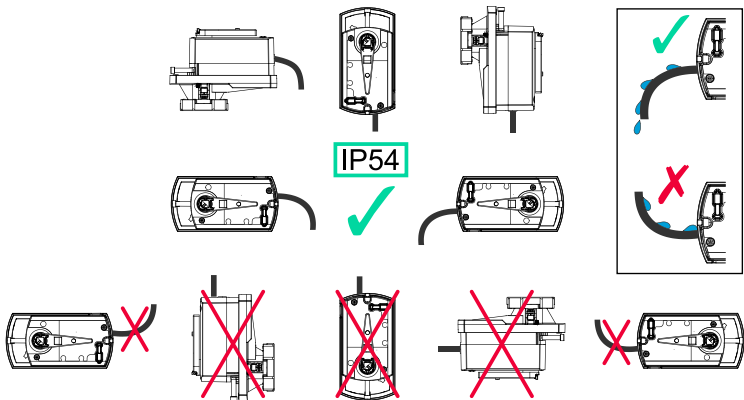

T_M Medium temperature

T_A Ambient temperature

   Application range actuator/valve
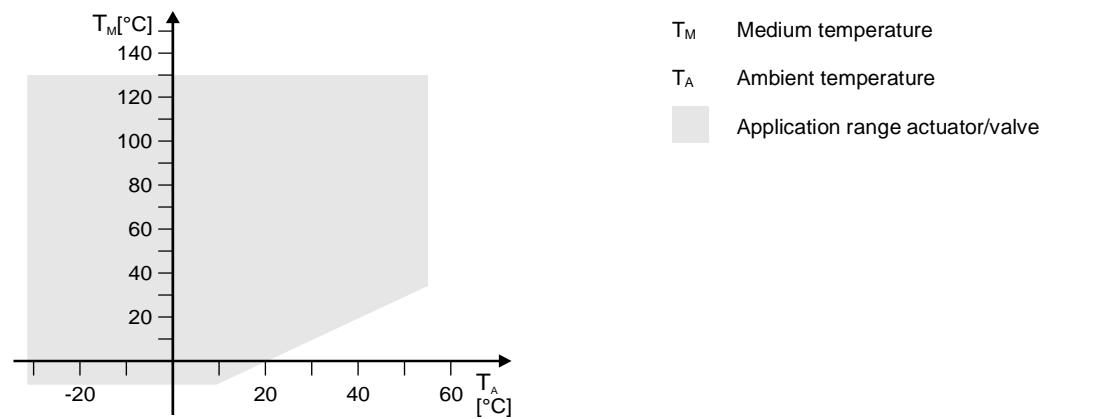
GDB161.9E/MO6P

The Modbus converter is designed for analog control at 0...10 V.

Mounting

Both ball valve and rotary actuator can be easily assembled directly at the mounting location. No special tools or adjustments required.

Protection against weather, humidity and dirt

	Protection against direct sunlight and rain.
	Correct mounting position and cable connection. Cables must be easily accessible.
	Protection only with closed cover!

Installation

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

Commissioning

When commissioning the system, check wiring and the functions of the rotary actuator.

Manual adjustment

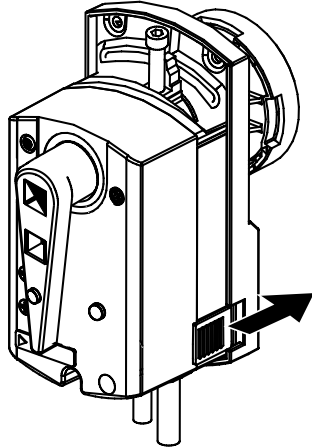The rotary actuator can be manually adjusted into any position between 0° and 90° by pushing the gear train disengagement slider.

If a control signal from the controller is present, this will take priority in determining the position after the slider is released.

For manual adjustment: Power off!

Maintenance

The actuators GDB161.9../..6.. are maintenance-free.

Disposal

♻	The device is considered an electronic device for disposal in accordance with European guidelines and may not be disposed of as domestic waste. ● Dispose of the device through channels provided for this purpose. ● Comply with all local and currently applicable laws and regulations.

Warranty

Technical data on specific applications are valid only together with Siemens products listed under "Equipment combinations". Siemens rejects any and all warranties in the event that third-party products are used.

Parameterization

The following operating mode is available for the GDB161.9E/MO6P model:
● 6WV operation mode: The actuator uses two separate setpoints for heating and cooling, each with a range of 0…100 %.

The GDB161.9../6P and GDB161.9../6W models have a specific 6-port firmware for the VWPG51.. and VWG4.. series respectively.

Operating mode "6WV" for GDB161.9E/MO6P

When using the 6WV operation mode, the parameters for these valve series can be selected:

- VWG4.. series 6-port control ball valves DN10 (VWG41..: standard; VWG42..: compact) and DN20
- VWPG51.. series 6-port pressure independent control ball valves (PICV) DN15 and DN20

Details on the characteristic curves of these valve series can be found in the datasheets A6V10564480 (VWG41..), A6V14034341 (VWG42..) and A6V12815016 (VWPG51..).

Note that the default actuator rotation direction is counter-clockwise (CCW).

One of the two setpoints (heating or cooling) needs to be "0 %" for the actuator to be able to move. If neither setpoint is "0 %", the actuator does not move until the setpoint conflict is resolved.

Valve angle and actuator position, example for VWPG51..
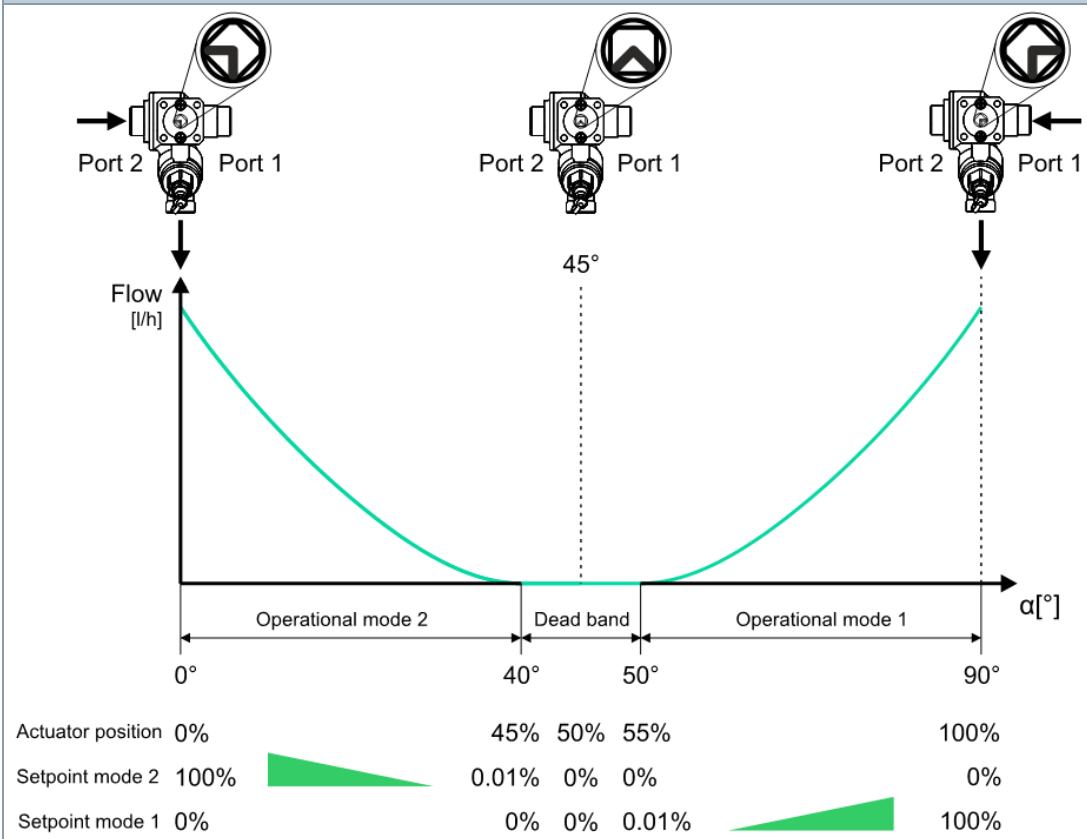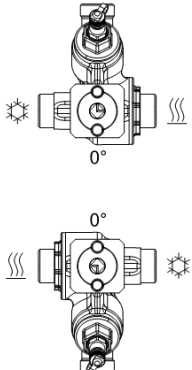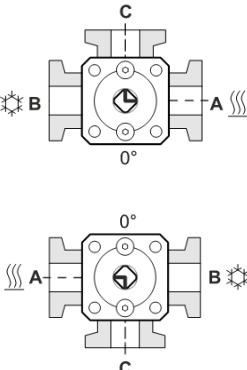
Parameters for standard piping of heating and cooling (GDB161.9E/MO6P rotation direction: CCW, Reg. 257 = 1):

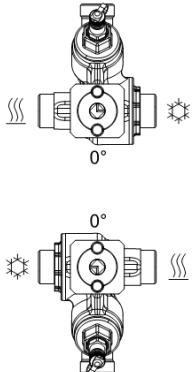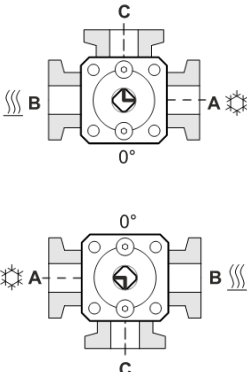| Parameter	VWPG51..		VWG42.10..		VWG41.10..		VWG41.20..	
	Valve angle	Actuator position	Valve angle	Actuator position [1]	Valve angle	Actuator position	Valve angle	Actuator position
MaxPositionHeating	90°	100 %	85°	95 %	75°	84 %	75°	84 %
MinPositionHeating	50°	57 %	55°	60 %	60°	67 %	50°	55 %
ClosedPosition	45°	50 %	45°	50 %	45°	50 %	45°	50 %
MinPositionCooling	40°	43 %	35°	40 %	30°	33 %	40°	45 %
MaxPositionCooling	0°	0 %	5°	5 %	15°	16 %	15°	16 %

[1] Must be manually configured for GDB161.9E/MO6P.

By rotary direction parameter inversion (CW, Reg. 257 = 0), heating and cooling are swapped:

Parameter	VWPG51..		VWG42.10..		VWG41.10..		VWG41.20..	
	Valve angle	Actuator position	Valve angle	Actuator position [1]	Valve angle	Actuator position	Valve angle	Actuator position
MaxPositionHeating	0°	100 %	5°	95 %	15°	84 %	15°	84 %
MinPositionHeating	40°	57 %	35°	60 %	30°	67 %	40°	55 %
ClosedPosition	45°	50 %	45°	50 %	45°	50 %	45°	50 %
MinPositionCooling	50°	43 %	55°	40 %	60°	33 %	50°	45 %
MaxPositionCooling	90°	0 %	85°	5 %	75°	16 %	75°	16 %

[1] Must be manually configured for GDB161.9E/MO6P.

Operating mode for GDB161.9../6P and GDB161.9../6W

The following analogue control types are available for the GDB161.9../6P and GDB161.9../6W models:

● 0…10 V control
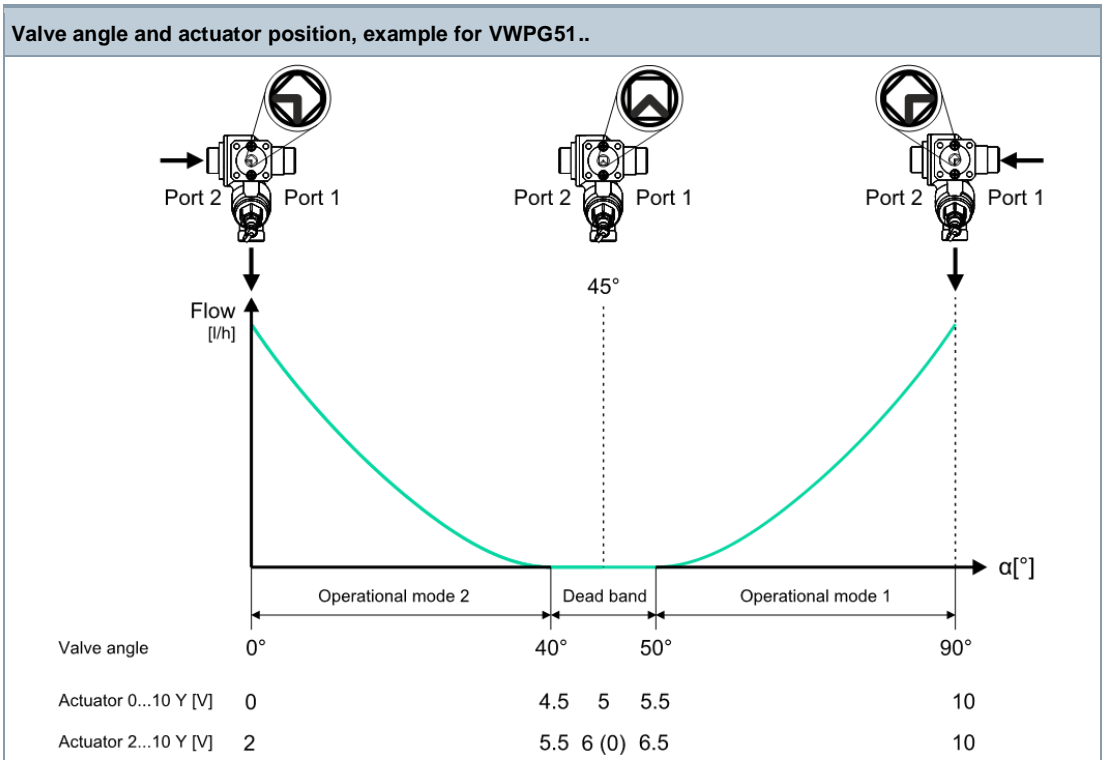● 2…10 V control: includes a backup function with the actuator driving the valve to the closed position (45°) for open Y signal input (0 V)

Note that the default actuator rotation direction is counter-clockwise (CCW).

Valve angle and actuator position, example for VWPG51..

Valve angle	0°		40°		50°		90°
Actuator 0...10 Y [V]	0		4.5	5	5.5		10
Actuator 2...10 Y [V]	2		5.5	6 (0)	6.5		10

Pre-setting

For the GDB161.9../6P modulating actuators, the maximum flow for cooling and heating for the VWPG51.. series 6-port pressure independent control ball valves can be set by:

● Manual pre-setting with screws on the actuator
● Voltage signal limitation to the actuator at controller or thermostat level

For the GDB161.9../6W modulating actuators, the maximum flow for cooling and heating for the VWPG51.. series 6-port pressure independent control ball valves can be set by:

● Voltage signal limitation to the actuator at controller or thermostat level

For the GDB161.9E/MO6P Modbus actuator, the maximum flow for cooling and heating for the VWPG51… series 6-port pressure independent control ball valves can be set via the following Modbus registers:

Address	Register	Name	Read/ Write	Range/Listing	Factory setting
259	260	Max. Limit Heating	RW	0...100 % = 0...10000	100 %
260	261	Max. Limit Cooling	RW	0...100 % = 0...10000	100 %

Manual pre-setting

Maximum flow for cooling and heating can be manually pre-set using the screws on the GDB161.9../6P actuators, limiting the rotation angle:

1. Set the screws to the desired position to meet application maximum flow for cooling and heating based on the flow presetting tables in the data sheet A6V12815016 for the VWPG51.. series valves.

Refer to the mounting instructions A6V12815008 for the GDB161.9../..6.. series actuators.
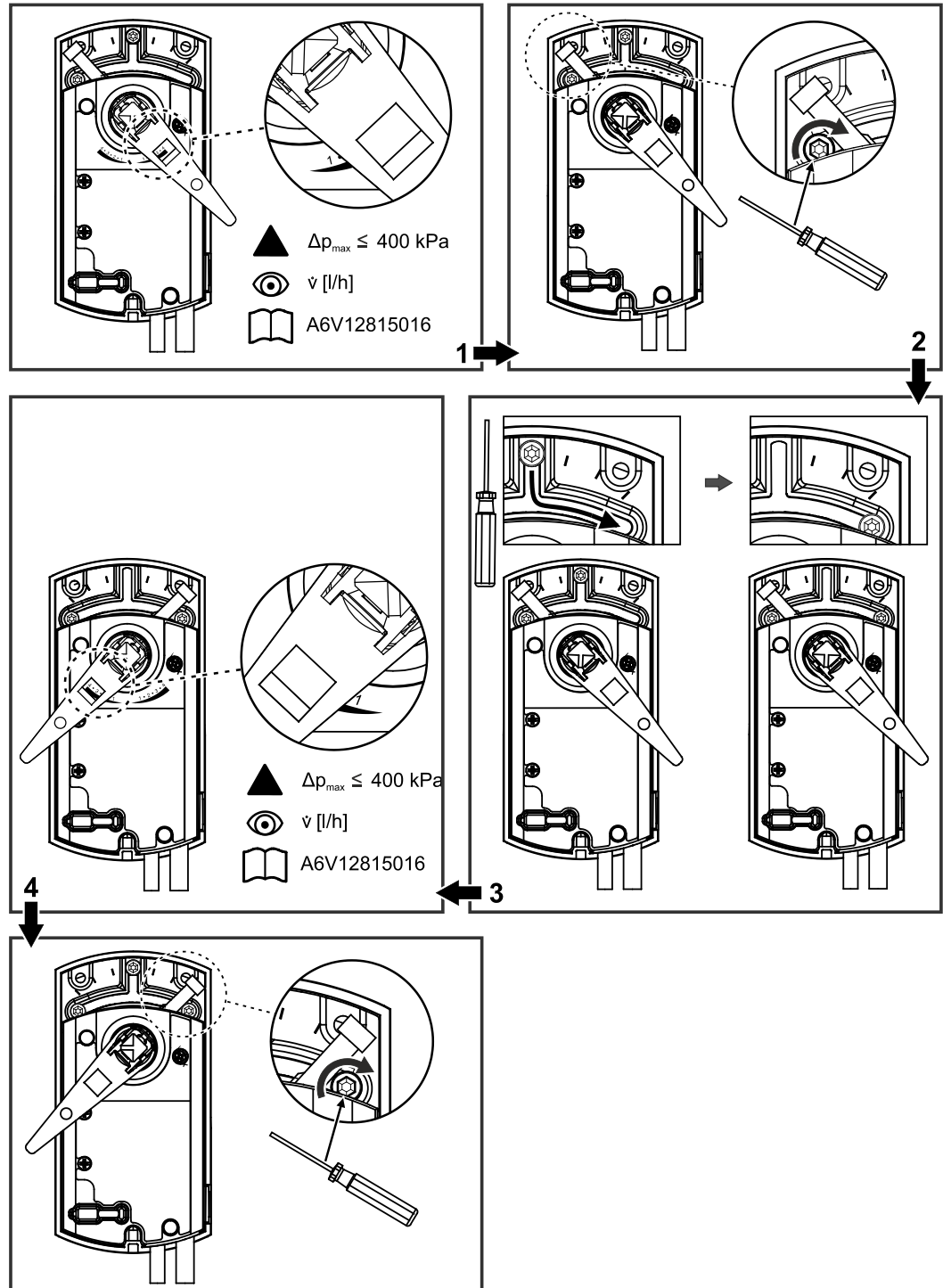
2. Power on the actuator.

3. Flip the DIP switch to activate self-calibration.
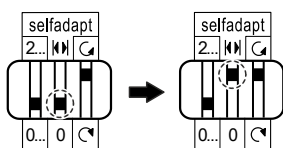
⇨ The screw positions are automatically found via self-calibration.

⇨ The actuator recognizes the new rotation angle and splits the 0/2…10 V control signal range through it.

⇨ The dead band area (45°) is fixed and not influenced by the new adjusted positions.
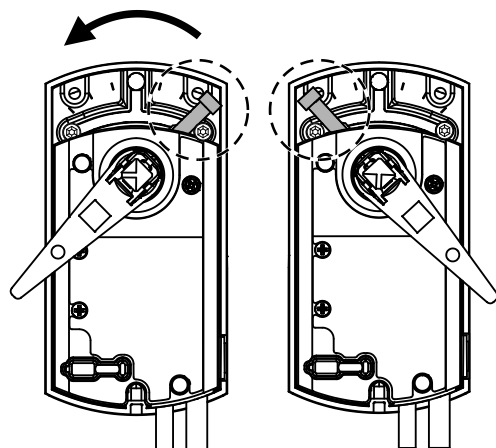
Voltage signal limitation pre-setting

Maximum flow for cooling and heating can be pre-set at the controller or thermostat level using voltage signal limitation to the actuator.

By limiting the voltage signal to the actuator, the rotation angle is limited as well, therefore reducing the maximum cooling and heating flows delivered by the valve.

The desired voltage signal limitation can be found in the flow presetting tables in the datasheet A6V12815016 for the VWPG51.. series valves.

Addr.	Reg.	Name	R/W	Range/Listing	Factory setting	Description
Process values						
0	1	Setpoint heating	RW	0...100 % = 0...10000	0 %	Heating setpoint through the actuator
1	2	Override control	RW	0 = Off / 2 = Close / 3 = Stop / 6 = MaxLimitHeating / 7 = MaxPositionHeating / 8 = MaxLimitCooling / 9 = MaxPositionCooling	0	Actuator's operation overriding the control signal
2	3	Actual position heating	R	0...100 % = 0...10000	-	Heating feedback position
3	4	Setpoint cooling	RW	0...100 % = 0...10000	0 %	Cooling setpoint through the actuator
4	5	Actual position cooling	R	0...100 % = 0...10000	-	Cooling feedback position
5	6	Actual flow heating	R	0…MaxFlow [l/h]	-	Heating flow indication MaxFlow depends on Reg. 271 "Valve model type"
6	7	Actual flow cooling	R	0…MaxFlow [l/h]	-	Cooling flow rate indication MaxFlow depends on Reg. 271 "Valve model type"
7	8	Temperature state	R	0 = Heating / 1 = Cooling / 2 = Neither	-	Actual operational mode
255	256	Actuator command	RW	0 = Ready / 1 = Calibrate adaption / 2 = Self-test / 3 = Reinitialize device / 4 = Factory reset	0	Invoke special operation commands

Addr.	Reg.	Name	R/W	Range/Listing	Factory setting	Description
Parameter						
256	257	Direction	RW	0 = CW / 1 = CCW	1	Actuator's rotation direction
258	259	Operating mode	R	1 = Pos / 3 = 6WV	3	Actuator's operating mode
259	260	Max. limit heating	RW	0...100 % = 0...10000	100 %	Heating presetting
260	261	Max. limit cooling	RW	0...100 % = 0...10000	100 %	Cooling presetting
261	262	Running time actuator	R	150 [s]	150 s	Actuator's running time
263	264	Tolerance blockade monitoring	RW	0...100 % = 0...10000	4 %	Allowed tolerance between setpoint and position in steady state
264	265	Max. position heating	RW	0...100 % = 0...10000	Depends on Reg. 270 "Valve series type"	Actuator's position reaching heating maximum flow based on selected valve type
265	266	Min. position heating	RW	0...100 % = 0...10000	Depends on Reg. 270 "Valve series type"	Actuator's position reaching heating minimum flow based on selected valve type
266	267	Closed position	RW	0...100 % = 0...10000	Depends on Reg. 270 "Valve series type"	Actuator's position reaching no flow based on selected valve type

Addr.	Reg.	Name	R/W	Range/Listing	Factory setting	Description
Parameter						
267	268	Min. position cooling	RW	0...100 % = 0...10000	Depends on Reg. 270 "Valve series type"	Actuator's position reaching cooling minimum flow based on selected valve type
270	269	Max. position cooling	RW	0...100 % = 0...10000	Depends on Reg. 270 "Valve series type"	Actuator's position reaching cooling maximum flow based on selected valve type
269	270	Valve series type	RW	0 = None / 1 = VWPG51 / 2 = VWG41.10 / 3 = VWG41.20	1 = VWPG51	Valve type selection
270	271	Valve model type	RW	0 = None / 1 = VWPG51.15L0.9 / 2 = VWPG51.15F1.2 / 3 = VWPG51.20F4.3	0 = None	Valve model selection Only available if Reg. 270 "Valve series type" = 1 [VWPG51]
512	513	Backup mode	RW	0 = BackupPosition / 1 = Keep / 2 = Disabled	2 = Disabled	Pre-defined actuator position in case no bus communication is detected for the duration of "Backup timeout" (Reg. 515)
513	514	Backup position	RW	0...100 % = 0...10000	50 %	Backup position selection
514	515	Backup timeout	RW	60...900 [s]	900 s	Backup timeout value selection
515	516	Startup setpoint	RW	0...100 % = 0...10000	50 %	Actuator's setpoint at startup
763	764	Modbus address	RW	1...245 / 255 = "Unassigned" 246 = On-event mode 248 → 255 = Unassigned	255	If the address is set to 248 or higher, it is instead automatically set to the initial address 255 as soon as Reg. 268 is set to 1 ("Load")
764	765	Baud rate	RW	0 = Auto / 1 = 9600 / 2 = 19200 / 3 = 38400 / 4 = 57600 / 5 = 76800 / 6 = 115200	0 = Auto	
765	766	Transmission format	RW	0 = 1-8-E-1 / 1 = 1-8-O-1 / 2 = 1-8-N-1 / 3 = 1-8-N-2	0 = 1-8-E-1	-
766	767	Bus termination	RW	0 = Off / 1 = On 120 Ω electronically switchable	0 = Off	
767	768	Bus conf. command	RW	0 = Ready / 1 = Load / 2 = Discard	0 = Ready	Load/discard Modbus settings
768	769	State	R	Cf. Register 769 "State"	-	Service flags, as explained in "Register 769 "State""

Statistics/Counters				
Reg.	**Name**	**R/W**	**Meaning**	**Example**
1025	Cumulated up time (HWord)	R	HWord + LWord = cumulated time device has been on (hex), i.e. the motor has been running or holding, in seconds	• 1025 = 00 12 (hex) • 1026 = A2 E1 (hex) • 12A2E1 (hex) → 1221345 (dec) → Cum. up time = 1'221'345 s
1026	Cumulated up time (LWord)	R		
1027	Cumulated running time (HWord)	R	HWord + LWord = cumulated running time (hex), i.e. for how long has the motor run, in seconds	• 1027 = 00 08 (hex) • 1028 = 12 51 (hex) • 81251 (hex) → 528977 (dec) → Cum. running time = 528.977 s
1028	Cumulated running time (LWord)	R		

Statistics/Counters

Reg.	Name	R/W	Meaning	Example
1029	Repositioning counter (HWord)	R	HWord + LWord = how often has the positioning signal been changed	● 1029 = 00 00 (hex) ● 1030 = A0 01 (hex) ● A001 (hex) → 40961 (dec) ➔ Repositioned = 40.961 times
1030	Repositioning counter (LWord)	R		
1031	Power-up counter	R	How often (hex) has the device been started up	● 1031 = 00 A2 (hex) → 162 (dec) ➔ Powered up = 162 times
1032	Jam counter	R	How often (hex) has the device breached the valve jam tolerance (reg. 264)	● 1032 = 00 02 (hex) → 2 (dec) ➔ Jams counted = 2

Device information

Reg.	Name	R/W	Meaning	Example
1281	Factory index	R	Two bytes, each encoding an ASCII character	● 1281 = 00 5A (hex) → 0Z ➔ Device is of series = "Z"
1282	Factory date (HWord)	R	Two bytes, the lower encoding the year (hex)	● 1282 = 00 18 (hex) ● 1283 = 02 0F (hex)
1283	Factory date (LWord)	R	Two bytes, HByte encoding the month (hex), LByte encoding the day (hex)	

	HWord		LWord	
	-	YY	MM	DD
Hex	00	18	02	0F
Dec	00	24	02	15

➔ Device was manufactured = February 15, 2024

Reg.	Name	R/W	Meaning	Example
1284	Serial number (HWord)	R	HWord + LWord = Serial no. (hex)	● 1284 = 00 0A (hex) ● 1285 = A2 06 (hex) ● → AA206 (hex) = 696838 (dec) ➔ Device has serial no. = "696838"
1285	Serial number (LWord)	R		
1289	Firmware version (HWord)	R	Two bytes, HByte corresponds to the major version, LByte corresponds to the minor version	● 1289 = 03 01 (hex) ● 1290 = 03 07 (hex) → 775 (dec) ➔ Firmware version = "03.01.0775"
1290	Firmware revision (LWord)	R	Two bytes, encoding the patch version (hex)	
1291	Hardware version	R	Two bytes, each encoding an ASCII character	● 1291 = 42 00 (hex) ➔ Hardware version = "B"
1409...16	ASN [characters 16...1]	R	Two bytes per register, each of which encodes an ASCII character. First characters encoded in Reg. 1409.	● 1409 = 47 44 (hex) → GD ● 1410 = 42 31 (hex) → B1 ● 1411 = 36 31 (hex) → 61 ● 1412 = 2E 39 (hex) → .9 ● 1413 = 45 2F (hex) → E/ ● 1414 = 4D 4F (hex) → MO ● 1415 = 36 50 (hex) → 6P ➔ ASN = " GDB161.9E/MO6P "

Register 769 "State"

Service flags			
Bit 00	1 = Reserved	Bit 06	1 = Not available
Bit 01	1 = Backup mode active	Bit 07	1 = Not available
Bit 02	1 = Not available	Bit 08	1 = Not available
Bit 03	1 = Not available	Bit 09	1 = Self-test failed
Bit 04	1 = Mechanical fault, device jammed or manual override [1] or calibrating [1]	Bit 10	1 = Self-test successful
Bit 05	1 = Not available	Bit 11	1 = Not available

[1]   After 10 seconds

Supported function codes

Function codes	
03 (0x03)	Read holding register
04 (0x04)	Read input registers
06 (0x06)	Write single register
16 (0x10)	Write multiple registers (Limit: Max. 120 registers within one write operation)

Communication properties

Communication		
Communication protocol	Modbus RTU	RS-485, not galvanically isolated
	Number of nodes	Max. 32
	Address range	1...245 / 255
	Factory setting	255
	Transmission formats	1-8-E-1, 1-8-N-1, 1-8-O-1, 1-8-N-2
	Factory setting	1-8-E-1
	Baud rates (kBaud)	Auto / 9.6 / 19.2 / 38.4 / 57.6 / 76.8 / 115.2
	Factory setting	Auto
	Bus termination	120 Ω electronically switchable
	Factory setting	Off
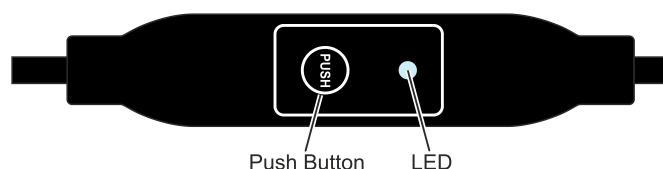
Push Button   LED

Pushbutton operation

Action		Pushbutton operation	Feedback
Return current Modbus address (starting from lowest address digit)		Briefly press button 1 x (<1 s)	1st digit (single digit): red 10-digit (double digit): green 100-digit (triple digit): orange LED blinks blue 1 x after address indication if bus termination is switched on. Example: 124 = 4 x red, 2 x green, 1 x orange
Switch bus termination on/off			
	Switch on	Press button 3 x Wait >1 s	LED stops blinking/flashing.
		Within 10 s: Briefly press button 1 x (<1 s)	LED flashes blue 1 x (termination mode on). Button not pressed within 10 s: - Address (and bus termination, if applicable) is indicated. - Device enters normal mode.
		Within 10 s: Press and hold button until LED turns red	LED is lit red (confirmation). Button not pressed within 10 s: - Address (and bus termination, if applicable) is indicated. - Device enters normal mode.
		Release button	LED turns off. Address is indicated. LED blinks blue 1 x after address indication (termination mode on). Device enters normal mode.
	Switch off	Press button 3 x Wait >1 s s	LED stops blinking/flashing.
		Within 10 s: Press and hold button until LED turns red	LED is lit red (confirmation). Button not pressed within 10 s: - Address (and bus termination, if applicable) is indicated. - Device enters normal mode.
		Release button	LED turns off. Address is indicated. [LED DOES NOT flash blue following address indication (termination mode off).] Device enters normal mode.

Action	Pushbutton operation	Feedback
Enter Modbus address using pushbutton	Press and hold button 1...5 s	See "Pushbutton addressing [▶ 19]"
Enable pushbutton addressing (together with Climatix™ controllers)	Press and hold button 5...10 s	LED is lit red and turns off after 5 s.
	Release button	LED is lit orange.
Reset to factory settings	Press and hold button >10 s	LED flashes orange.

LED colors and flashing patterns

Color	Blinking pattern	Description
Green	1 s on / 5 s off	Normal mode without bus traffic
	Flickering	Normal mode with bus traffic
Orange [1] / Green	1 s orange / 1 s green	Device is in override control mode
Orange [1]	1 s on / 1 s off	Bus parameter not yet configured
	1 s on / 5 s off	Device is in backup mode (replacement mode)
Red	Permanently lit	Mechanical error, device blocked, manual intervention or calibration
	1 s on / 5 s off	Internal error
	0.1 s on / 1 s off	Invalid configuration, e.g. Min = Max
Blue	Flickers 1 x after indicating the address	Bus termination active

[1] The color of the orange LED can vary depending on the viewing angle, and appear more yellow or greenish.

Resetting the actuator by pushbutton

1. Press and hold button >10 s.
   ⇨ LED flashes **orange**.
2. Release button *while* LED is flashing.
   ⇨ LED flashes for another 3 s.
   ⇨ If the button is pressed again *during* these 3 s, **the reset is canceled**.
3. Press button *after* these 3 s.
⇨ LED is lit **red** (reset) while the device restarts.

Display current address (digits in reverse order)

The Modbus address can be set without an extra tool using pushbutton addressing.

To display the current Modbus address, press the button < 1 s.

Colors		
1-digit: **red**	10-digit: **green**	100-digit: **orange**
Example for address **124**:		
LED		
Note	The address is entered and displayed beginning at the lowest digit (1st digit), see figure above. (Example: 124 starts with 4 x red)	

Set new address (digits in reverse order)

1. **Enter addressing mode:**
   - Press button >1 s, until LED is lit **red**.
   - Release button (before LED turns off).

2. **Enter digits: Press button n times.**
   ⇨ LED flashes 1 x per press of the button as feedback.
      Colors: 1-digit: **red** / 10-digit: **green** / 100-digit: **orange**

3. **Save digits:**
   - Press and hold button, until LED is lit the color of the following digit.
   - Release button.

4. **Save address:**
   - Press button, until LED is lit **red** (confirmation).
   - Release button.

⇨ Address is saved and repeated 1 x as confirmation.

i	Digits are skipped by holding the button until the LED is lit the color of the digit to be entered.

i	An address can be saved at any point, i.e. already after setting the 1-digit, or after setting the 1- and 10-digits.

i	The entered address is discarded if the button is released before the LED is lit red.

Examples

Set address "124"

1. Enter addressing mode: press button 1...5 s.
2. Enter 1-digit: press button 4 x.
   ⇨ LED flashes **red** 1 x per press of the button.
3. Save 1-digit: press and hold button.
   ⇨ LED is lit **green**.
4. Release button.
5. Enter 10-digit: press button 2 x.
   ⇨ LED flashes **green** 1 x per press of the button.
6. Save 10-digit: press and hold button.
   ⇨ LED is lit **orange**.
7. Release button.
8. Enter 100-digit: press button 1 x.
   ⇨ LED flashes **orange** 1 x per press of the button.
9. Save address: press and hold button.
   ⇨ LED is lit **red**.
10. Release button.
⇨ Address is saved and repeated 1 x as confirmation.

Set address "50"

1. Enter addressing mode: press button 1...5 s.
2. Skip 1-digit: press and hold button.
   ⇨ LED is lit **green**.
3. Release button.
4. Enter 10-digit: press button 5 x.
   ⇨ LED flashes **green** 1 x per press of the button.
5. Save 10-digit: press and hold button.
   ⇨ LED is lit **orange**.
6. Release button.
7. Save address (skip 100-digit): press and hold button.
   ⇨ LED is lit **red**.
8. Release button.
⇨ Address is saved and repeated 1 x as confirmation.

Set address "7"

1. Enter addressing mode: press button 1...5 s.
2. Enter 1-digit: press button 7 x.
   ⇨ LED flashes **red** 1 x per press of the button.
3. Save address (skip 10- and 100-digits): press and hold button.
   ⇨ LED is lit **red**.
4. Release button.
⇨ Address is saved and repeated 1 x as confirmation.

Power supply			
Operating voltage (SELV/PELV) / Frequency	GDB161.9../6W GDB161.9../6P		AC 24 V ~ ± 20 % (19.2…28.8 V ~) / 50/60 Hz DC 24…48 V = ± 20 % (19.2…57.6 V =) [1]
	GDB161.9E/MO6P		AC 24 V ~ ± 20 % (19.2…28.8 V ~) / 50/60 Hz DC 24 V = ± 20 % (19.2…28.8 V =)
Power consumption	Running	GDB161.9../6W GDB161.9../6P	2.1 VA / 1.2 W
		GDB161.9E/MO6P	2.6 VA / 1.7 W
	Holding	GDB161.9../6W GDB161.9../6P	0.7 W
		GDB161.9E/MO6P	1.2 W

[1] cUL: Permitted only to DC 30 V =

Function data	
Nominal torque	5 Nm
Maximum torque (when blocked)	10 Nm
Minimum holding torque	5 Nm
Nominal rotation angle (with position indication)	90°
Maximum rotation angle (mechanically limited)	95° ± 2°
Runtime at nominal rotational angle 90°	150 s
Permissible medium temperature in the valve in combination with GDB.. actuators	0...120 °C s
Actuator sound power level	28 dB(A)

Inputs		
Positioning signal for GDB161.9../6..		
Input voltage	(wires 8-2/Y-G0)	
Current consumption		0.1 mA
Input resistance		> 100 kΩ
Max. permissible input voltage		DC 35 V = limited to DC 10 V =
Protected against faulty wiring		Max. AC 24 V ~ / DC 24…48 V =
Hysteresis		45 mV

Outputs			
Position indicator (GDB161.9../6..)			
	Output signal	(Wires 9-2/U-G0)	
	Output voltage U		DC 0...10 V =
	Max. output current		DC ± 1 mA
	Protected against faulty wiring		Max. AC 24 V ~ / DC 24…48 V =

Communication GDB161.9E/MO6P		
Communication protocol		
	Modbus RTU	RS-485, not galvanically isolated
	Number of nodes	Max. 32
	Address range	1…245 / 255
	Factory setting	255
	Transmission formats	1-8-E-1 / 1-8-O-1 / 1-8-N-1 / 1-8-N-2
	Factory setting	1-8-E-1
	Baud rates (kBaud)	Auto / 9.6 / 19.2 / 38.4 / 57.6 / 76.8 / 115.2
	Factory setting	Auto
	Bus termination	120 Ω electronically switchable
	Factory setting	Off

Connection cables		
Cable length	GDB161.9E/6W GDB161.9E/6P GDB161.9E/MO6P	0.9 m
	GDB161.9G/6W GDB161.9G/6P	3 m
	GDB161.9H/6W GDB161.9H/6P	5 m
Cable cross-section		0.75 mm^2
Permissible length for signal lines	GDB161.9E/6W GDB161.9E/6P	10 m
	GDB161.9E/MO6P	300 m

Degree of protection		
Insulation class		As per EN 60730
	AC 24 V ~ / DC 24…48 V =, feedback potentiometer	III
Housing protection		IP54 as per EN 60529

Ambient conditions		
Operation		As per IEC 60721-3-3 (1994)
	Climatic conditions	Class 3K5
	Mounting location	Interior, weather-protected
	Temperature (extended)	-32...55 °C
	Humidity (non-condensing)	< 95 % r.h.
Transportation		As per IEC 60721-3-2 (1994)
	Climatic conditions	Class 3K5 / Class 2K3
	Temperature (extended)	-32...70 °C
	Humidity (non-condensing)	< 95 % r.h.
Storage		As per IEC 60721-3-1 (1994)
	Climatic conditions	Class 1K3
	Temperature (extended)	-32…50 °C
	Humidity (non-condensing)	< 95 % r.h.
Mechanical ambient conditions		Class 2M2

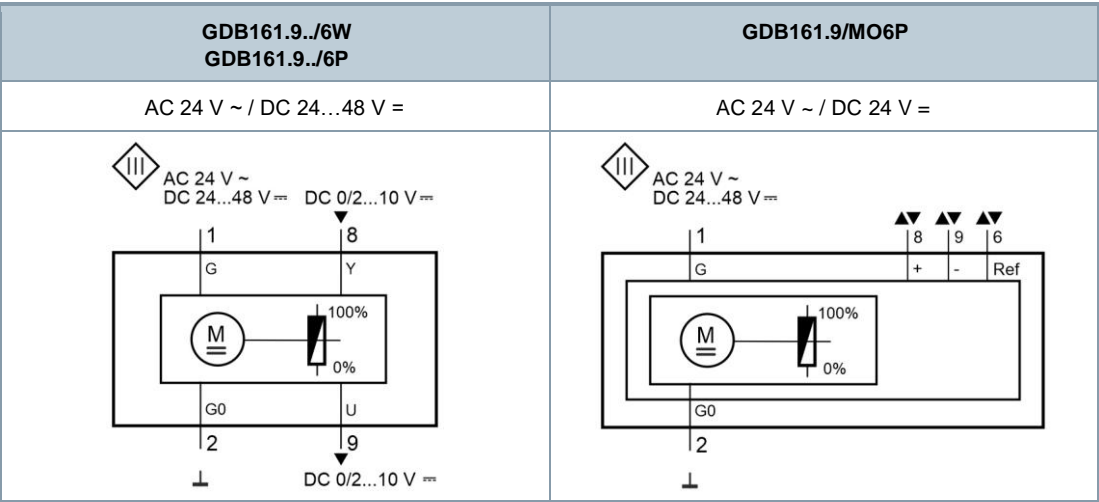| Standards, directives and approvals		
Product standard		EN 60730 Part 2-14: Particular requirements for electric actuators
Electromagnetic compatibility (Applications)		For residential, commercial, light-industrial and industrial environments
EU conformity (CE)		A5W00003842 [2]
RCM conformity		A5W00003843 [2]
EAC Conformity		Eurasian conformity
UL	UL	As per UL 60730 http://ul.com/database
	cUL	As per CSA-C22.2 No. 24-93
UKCA		A5W00198029A [2]

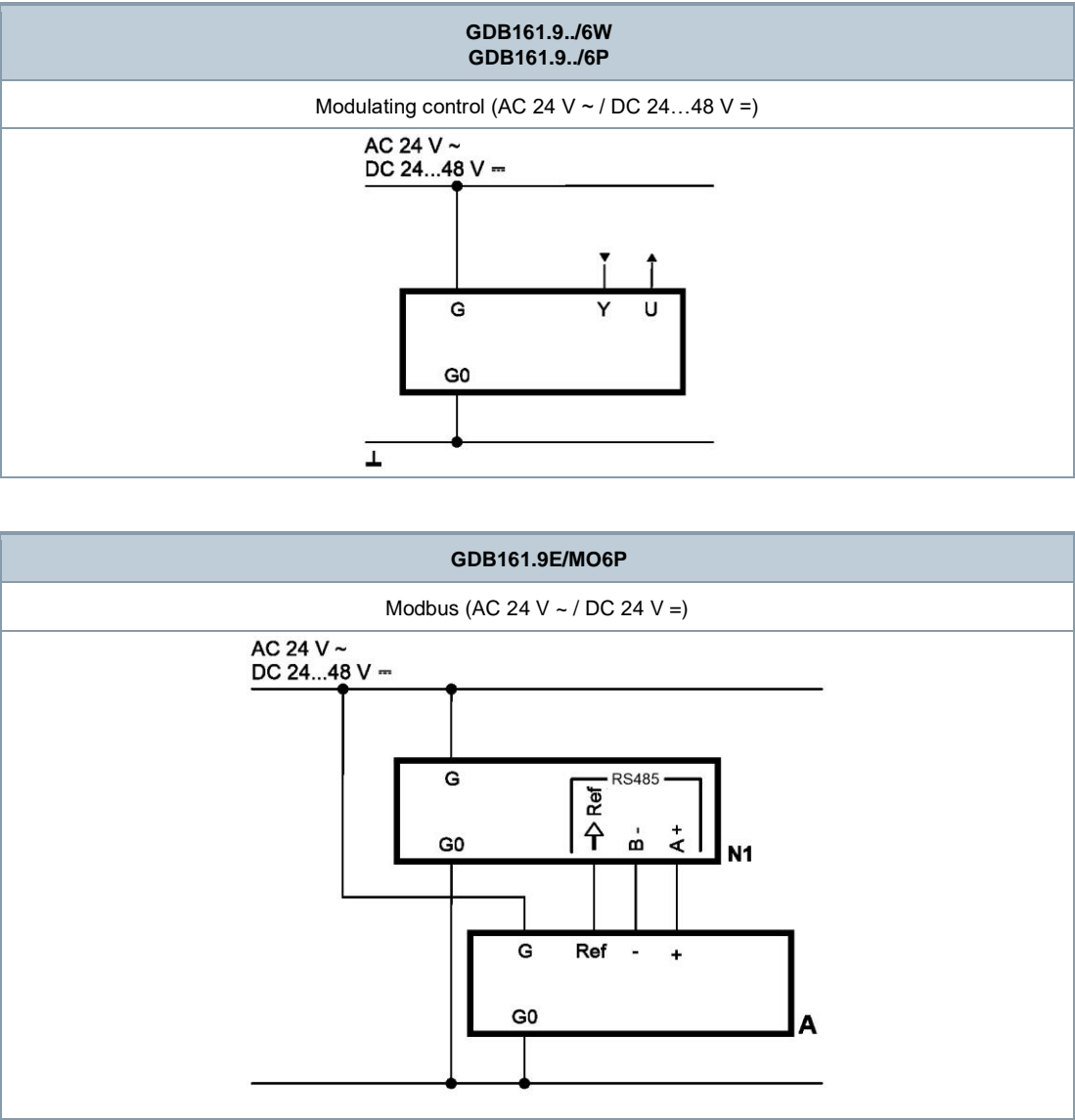| Environmental compatibility |
|---|
| The product environmental declaration A5W00026068 [2] contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal). |

Dimensions	
Actuator W x H x D	Cf. "Dimensions [▶ 25]"

Weight		
Excl. packaging		0.69 kg
	External Modbus converter	0.15 kg

[2] Documents can be downloaded at http://www.siemens.com/bt/download

Diagrams

Internal diagrams

GDB161.9../6W GDB161.9../6P	GDB161.9/MO6P
AC 24 V ~ / DC 24…48 V =	AC 24 V ~ / DC 24 V =

Connection diagrams

GDB161.9../6W GDB161.9../6P
Modulating control (AC 24 V ~ / DC 24…48 V =)

GDB161.9E/MO6P
Modbus (AC 24 V ~ / DC 24 V =)

Cable designations

| Connecting thread	Cable				Meaning
	Code	No.	Color	Abbreviation	
Rotary actuators AC 24 V ~ DC 24...48 V =	G	1	Red	RD	System potential AC 24 V ~ / DC 24 V...48 V =
	G0	2	Black	BK	System neutral
	Y	8	Grey	GY	Signal in (GDB161.9../6..)
	U	9	Pink	PK	Signal out (GDB161.9../6..)
Modbus AC 24 V ~ DC 24 V =	REF	6	Purple	VT	Reference line (Modbus RTU)
	+	8	Grey	GY	Bus + (Modbus RTU)
	-	9	Pink	PK	Bus - (Modbus RTU)

Dimensions

Actuator
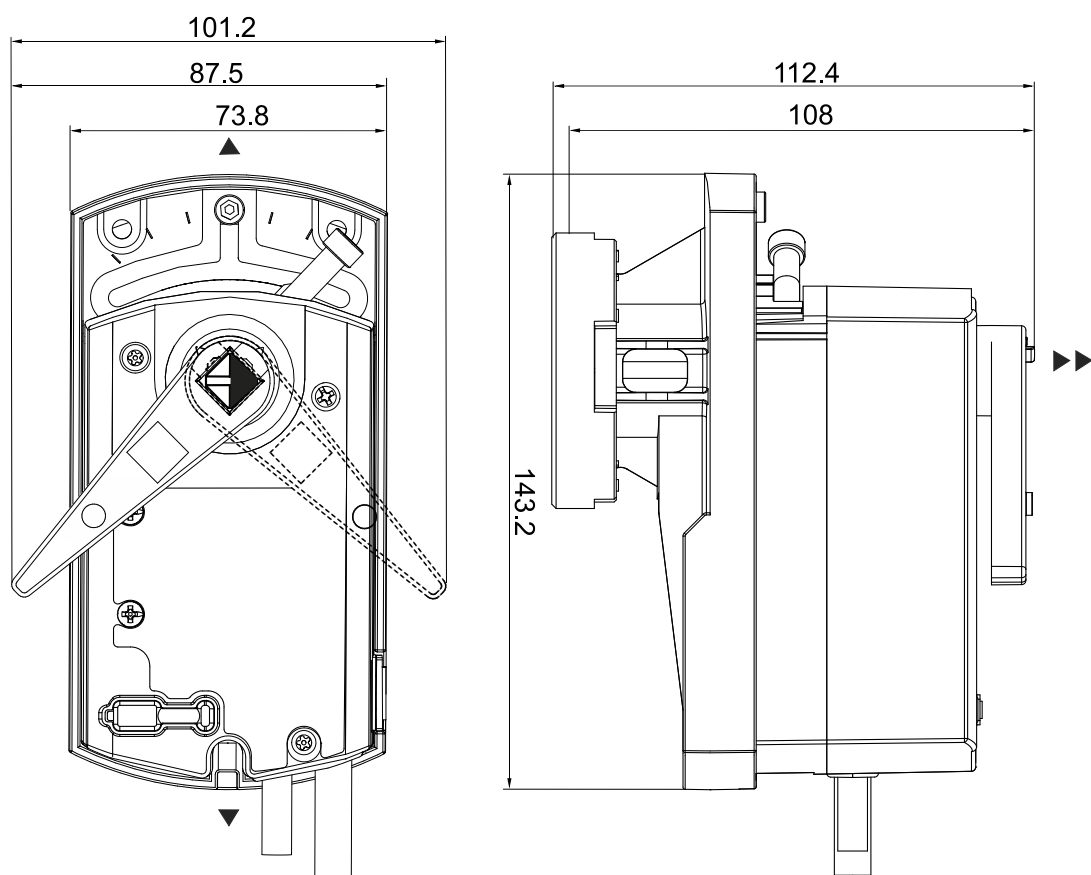
Dimensions in mm

► => 100 mm   Min. clearance from ceiling or wall for mounting, connection, operation, maintenance, etc.

►► => 36 mm

External Modbus converter
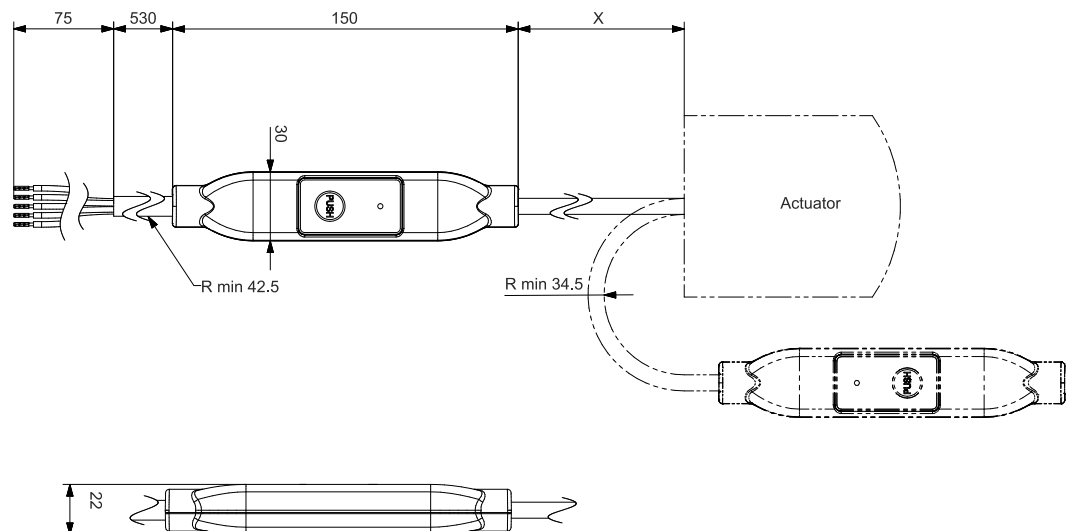
Revision numbers

Type	Valid from rev. no.
GDB161.9E/6W S55499-D784	..A
GDB161.9G/6W S55499-D829	..A
GDB161.9H/6W S55499-D830	..A
GDB161.9H/6W100 S55499-D925	..A
GDB161.9E/6P S55499-D801	..A
GDB161.9G/6P S55499-D827	..A
GDB161.9H/6P S55499-D828	..A
GDB161.9H/6P100 S55499-D926	..A
GDB161.9E/MO6P S55499-D802	..A

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