

OpenAir™

VAV Compact Controller KNX / PL-Link

G..B181.1E/KN



VAV Compact Controller 5 / 10 Nm with KNX communication

- GDB181.1E/KN with 5 Nm nominal torque
- GLB181.1E/KN with 10 Nm nominal torque
- Operating voltage AC 24 V
- Supports KNX S-Mode, LTE-Mode, and PL-Link
- For plants with variable or constant air-volume flow

Functions

Function	Description
Communication	<ul style="list-style-type: none"> - KNX-TP, galvanically separated - Max. 256 nodes per line (with repeaters) - Busload 5 mA
Functions	<ul style="list-style-type: none"> - Setpoint 0..100% - Actual values for volume flow, damper position and differential pressure - Operating modes for volume flow control or position control - Override control with binary communication objects - Setpoint monitoring and backup mode

For a detailed description of specific functions please refer to the product documentation P3547.

Type summary

Product no.	Stock no.	Operating voltage	Positioning signal	Power consumption	Positioning time	Manual adjuster	Position feedback
GDB181.1E/KN	S55499-D134	AC 24 V	KNX-TP	1 VA / 0,5 W	150 s	Yes	Yes
GLB181.1E/KN	S55499-D135			3 VA / 2,5 W ¹⁾			

Please refer to data sheet **N4698** for information on accessories and spare parts.

¹⁾ Actuator rotates

Ordering (Example)

Product no.	Stock no.	Description	Amount
GDB181.1E/KN	S55499-D134	VAV Compact Controller KNX	1

Equipment combinations

Product no.	Stock no.	Description	Doc. type	Doc. number
AST20	S55499-D165	Handheld tool for commissioning and service	Datasheet	A6V10631836
			Operating manual	A6V10555077
ACS931		PC Software for OEMs	Datasheet	N5853
ACS941		PC Software for Service	Datasheet	N5852

Software versions

VAV Compact Controllers series G are designed for using ETS device profile v2.x, however ETS device profile v1.x is supported for backward compatibility reasons.

Firmware / software version	Series E	Series F	Series G
Production period	10/2011 – 03/2014	03/2014 – 01/2017	01/2017
Bus module FW version	4.16	4.18	4.24
ETS device profile v1.x	supported	supported	supported
ETS device profile v2.x	not supported	not supported	supported

Title	Topic	Document ID
VAV Compact Controllers KNX / PL-Link – Technical Basics	Detailed information about the VAV compact controllers with KNX / PL-Link communication	P3547
Mounting Instruction VAV Compact Controllers KNX / PL-Link	Mounting / installation instruction for VAV compact controllers KNX / PL-Link 5 / 10 Nm	M3547

How to obtain documentation and product-related software

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

<http://siemens.com/bt/download>

The ETS device profile can be downloaded at the following Internet address:

<http://siemens.com/hvac-td>

HMI (Human-Machine Interface)

For more detailed explanations on device states, functions, and error display please refer to the product documentation P3547.

Push-button operation

Activity	Push-button operation	Confirmation
Enter / leave addressing mode	Press button < 1s	LED turns red or gets off
Reset to factory settings	Press button > 20s	LED flashes orange until device restarts
PL-Link connection test ²⁾	Press key >2s and < 20s	LED flashes 1x orange

LED colors and patterns

Color	Pattern	Description
Off	---	Fault free operation or device not powered
Green	steady	Connection test successful ²⁾
Orange	flashing	a) Factory reset in progress b) When a connection test was triggered: wait ²⁾
Red	steady	c) Device is in programming/addressing mode d) When a connection test was triggered: Connection test failed ²⁾

²⁾ Function or part of the function available in PL-Link operation only

Addressing and bus test with push button

The VAV compact controllers can be set into addressing/programming mode by push-button:

- Press push button (>0.1s and <1s)
- KNX bus wiring OK → LED turns red until addressing/programming is finished
- KNX bus wiring not OK → LED stays dark

Reset with push button

The VAV compact controllers can be reset by push-button:

- Press push button > 20s
- LED flashes orange
- Device restarts

All parameters which can be set by the OEM are reset to the OEM default values.

Parameterization of the VAV application

The OEM generally provides the basic configuration to VAV compact controllers, especially the parameters for nominal flow (V_{nom}), the opening direction, and the box coefficient (V_n). The setting of all other parameters depends on the actual application and is usually defined by the ventilation planner or the systems integrator.

The following parameters must be checked or set prior to commissioning:

Parameter	Range	Description	Factory setting
Operating mode	VAV (flow ctrl.) / POS (position ctrl.)	Interpretation of setpoint VAV = setpoint commands volume flow [%] POS = setpoint commands damper position [%]	VAV
Opening direction	CW (R) / CCW (L)	Opening direction of air damper	CW (R)
Adaptive positioning	Off / On	Adaption of actual opening range to position feedback Off = No adaption / mapping $0^\circ..90^\circ \rightarrow 0..100\%$ On = Pos. adaption / mapping e.g. $0^\circ..60^\circ \rightarrow 0..100\%$	Off
Vmin	-20... 100%	Minimum air volume flow	0 %
Vmax	20... 120%	Maximum air volume flow	100 %
Vnom	0...60'000 m ³ /h	Nominal air volume flow ³⁾	100 m ³ /h
Box coefficient (Vn)	1...3.16	Characteristic value for the air volume flow; set by the manufacturer (OEM)	1
Altitude	0...5000m in 500m steps	Altitude level correction factor for differential pressure sensor (select n*500m value closest to real altitude)	500 meters

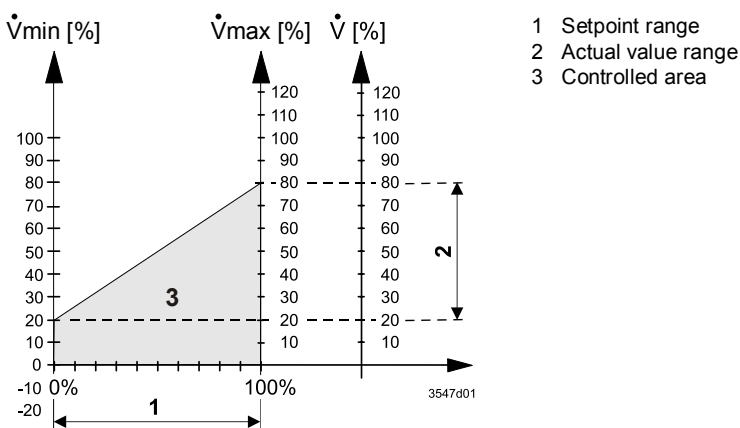
Please refer to technical basics **P3547** for more explanation.

³⁾ Value used for displaying / not used for volume flow control loop

Operating mode “Volume flow control”

Variable air volume (VAV) control

The operating point is determined by the setpoint value and the Vmin / Vmax settings.



Constant air volume (CAV) control

A constant air volume flow can be achieved by sending a constant setpoint value or by setting $V_{min} = V_{max}$.

Operating mode “Position control”

The VAV compact controllers can be operated as damper actuators, i.e. using the 0..100% setpoint as position damper setpoint, by setting the operating mode parameter to “POS”.

Parameterization of the KNX bus integration

The following parameters are usually checked and set by the systems integrator to achieve the right level of bus traffic generated by the actuator or to define the behavior in case of communication interruption. Parameters in the group “advanced” can be left unchanged unless a special configuration is required.

Parameter group “Standard”:

Parameter	Range	Description	Factory setting
Backup timeout	0..60 min 0 min = disabled	Time interval to detect communication interruption. If disabled, the VAV Compact Controller controls to the last received volume flow setpoint until a new setpoint is received.	30 min.
Backup mode	Backup position Keep last position	VAV Compact Controller behavior when the communication timeout has been exceeded (no setpoint received within the defined time interval). <ul style="list-style-type: none"> ▪ Backup position: Actuator drives to defined position ▪ Keep last position: Actuator keeps position without flow control 	Backup position
Backup value	0..100%	Position the damper drives to in case of communication interruption	50%

Parameter group “Advanced”:

Parameter	Range	Description	Factory setting
Hysteresis (COV) ⁶⁾ volume flow	1..20%	Threshold for the relative volume flow. COV below this value are not sent over the bus.	1%
Min. repetition time volume flow	10..900 s	Minimum waiting time until a COV above the hysteresis threshold is sent over the bus	10 s
Hysteresis (COV) damper position	1..20%	Threshold for the damper position. COV below this value are not sent over the bus	1%
Min. repetition time damper position	10..900 s	Minimum waiting time until a COV above the hysteresis threshold is sent over the bus	10 s
Override position 1	0..100%	Damper position to which the actuator drives if the associated group object is triggered (override priority)	0%
Override position 2	0..100%	Damper position to which the actuator drives if the associated group object is triggered (override priority)	100%

⁶⁾ COV = Change of value

Safety

⚠ Caution

National safety regulations

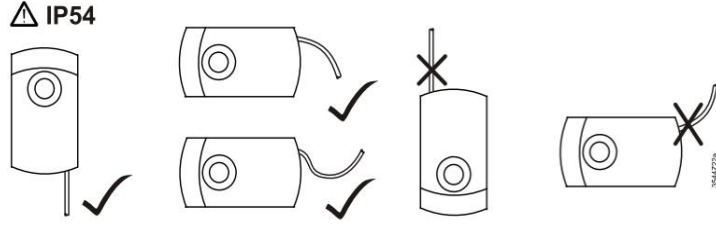
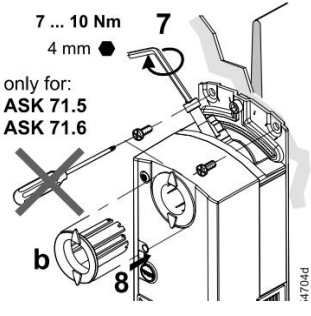
Failure to comply with national safety regulations may result in personal injury and property damage.

- Observe national provisions and comply with the appropriate safety regulations.

Mounting

- Do not open the damper actuators
- Do not use the accessory mounting holes for fixation of the damper actuators

Mounting positions

IP54 protection in following mounting positions	Accessory mounting holes ⁷⁾
 <p>⚠ IP54</p>	 <p>7 ... 10 Nm 4 mm</p> <p>only for: ASK 71.5 ASK 71.6</p> <p>Cf. mounting instr. M3547</p>

⚠ ⁷⁾ Not to be used for fixation of the actuator, use anti-rotation-bracket instead.

Maintenance

The damper actuators are maintenance-free.

Disconnect the electrical connections from the terminals if you want to work at the device.

Disposal



The device is considered an electronics device for disposal in terms of European Directive 2012/19/EU and may not be disposed of as domestic garbage.

- 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.

KNX Group Objects

Nr.	Name in ETS	Object function	Flags					Data point type KNX				Range
			C	R	W	T	U	ID	DPT_Name	Format	Unit	
1	Fault information	Transmit	1	1	0	1	0	219.001	_AlarmInfo	6 Byte	---	[0...255] = Log Nr. [0...2] = Alarm priority [0...14] = Application area [0...4] = Error class [0...7] = Attributes [0...7] = Alarm status
2	Fault state	Transmit	1	1	0	1	0	1.005	_Alarm	1 bit	---	0 = No alarm 1 = Alarm
3	Fault transmission	Receive	1	0	1	0	1	1.003	_Enable	1 bit	---	0 = Disable 1 = Enable
4	Setpoint	Receive	1	1	1	0	1	5.001	_Scaling	1 Byte	%	0..100%
5	Damper position	Transmit	1	1	0	1	0	5.001	_Scaling	1 Byte	%	0..100%
6	Volume flow relative ⁵⁾	Transmit	1	1	0	1	0	5.001	_Scaling	1 Byte	%	0..100%
		Transmit	1	1	0	1	0	8.010	_Percent_V16	2 Bytes	%	-327.68..327.67%
		Transmit	1	1	0	1	0	5.004	_Percent_U8	1 Byte	%	0..255%
7	Volume flow absolute ⁵⁾	Transmit	1	1	0	1	0	9.009	_Value_Airflow	2 Bytes	m ³ /h	-670 760..670 760 m3/h
		Transmit	1	1	0	1	0	14.077	_Volume_Flux	4 Bytes	m ³ /s	0..(2 ³² -1)
8	Fault	Transmit	1	1	0	1	0	1.005	_Alarm	1 bit	---	0 = No alarm 1 = Alarm
9	Overridden	Transmit	1	1	0	1	0	1.002	_Bool	1 bit	---	0 = False 1 = True
10	Override position 1	Receive	1	1	1	0	1	1.003	_Enable	1 bit	---	0 = Disable 1 = Enable
11	Override position 2	Receive	1	1	1	0	1	1.003	_Enable	1 bit	---	0 = Disable 1 = Enable
12	Balancing mode	Receive	1	1	1	0	0	1.003	_Enable	1 bit	---	0 = Disable 1 = Enable
13	Vmin ⁵⁾	Receive	1	1	1	0	1	8.010	_Percent_V16	2 Bytes	%	-327.68..327.67%
14	Vmax ⁵⁾	Receive	1	1	1	0	1	8.010	_Percent_V16	2 Bytes	%	-327.68..327.67%
15	Vnom	Read-only	1	1	0	0	0	9.009	_Value_Airflow	2 Bytes	m3/h	-670 760..670 760 m3/h
16	Opening direction	Read-only	1	1	0	0	0	1.012	_Invert	1 bit	---	0 = Not Inverted 1 = Inverted
17	Diff. pressure ⁶⁾	Read-only	1	1	0	0	0	9.006	_Value_Pres	2 Bytes	Pa	0..670 760 Pa
		Read-only	1	1	0	0	0	14.058	_Value_Pressure	4 Bytes	Pa	0..(2 ³² -1)
18	Coefficient	Read-only	1	1	0	0	0	14.*	4-Byte Float	4 Bytes	---	0..3.16
19	OEM-Reset	Receive	1	0	1	0	0	1.017	_Trigger	1 bit	---	0, 1 = Trigger

⁵⁾ For technical reasons, values for Vmin / Vmax need to be entered with two trailing "0" in ETS5, i.e. to get Vmin = 5%, enter "500%" in ETS5. The same applies for read-back values.

⁶⁾ For some group objects, alternative data point types (DPT) can be selected in ETS. The first entry indicates the default setting.

Technical data

Power supply		
Operating voltage	G..B181.1E/..	AC 24 V ± 20 % (SELV) or AC 24 V class 2 (US)
Frequency		50/60 Hz
Power consumption	at 50 Hz	
	Actuator holds	1 VA / 0.5 W
	Actuator rotates	3 VA / 2.5 W
Function data		
Positioning time for nominal rotation angle	G..B181.1E/..	150 s (50 Hz) 125 s (60 Hz)
Nominal torque	GDB..	5 Nm
	GLB..	10 Nm
Maximum torque	GDB..	< 7 Nm
	GLB..	< 14 Nm
Nominal / maximum rotation angle		90° / 95° ± 2°
Direction of rotation	Adjustable by tool or over bus	Clockwise (CW) / Counter-clockwise (CCW)
Connection cables		
Cable length		0.9 m
Power supply	Number of cores and cross-sectional area	2 x 0.75 mm ²
Communication	Number of cores and cross-sectional area	2 x 0.75 mm ²
Service interface	Terminal strip	7-pin, grid 2.00 mm
Communication		
Communication protocol	Connection type	KNX-TP (el. isolated)
	Bus load	5 mA
Degree of protection		
Degree of protection	Degree of protection acc. to EN 60529 (see mounting instruction)	IP54
Safety class	Safety class acc. to EN 60730	III

Environmental conditions		
Applicable standard		IEC 60721-3-x
Operation	Climatic conditions	Class 3K5
	Mounting location	Indoors
	Temperature general	0...50 °C
	Humidity (non condensing)	5...95 % r. F.
Transport	Climatic conditions	Class 2K3
	Temperature	-25...70 °C
	Humidity	5...95 % r. h.
Storage	Climatic conditions	Class 1K3
	Temperature	-5...45 °C
	Humidity	5...95 % r. h.

Directives and Standards		
Product standard		EN60730-x
Electromagnetic compatibility (Application)		For residential, commercial and industrial environments
EU Conformity (CE)		GDB181.1E/KN
		GLB181.1E/KN
RCM Conformity		A5W00003842 ¹⁾ A5W0000176 ¹⁾
UL, cUL	AC 24 V	A5W00003843 ¹⁾ A5W0000177 ¹⁾
		UL 873 http://ul.com/database

Environmental compatibility	
	The product environmental declaration A6V10209938 ¹⁾ contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).

Dimensions / Weight		
Weight	Without packaging	0.6 kg
Dimensions		71 x 158 x 61 mm
Suitable drive shafts	Round shaft (with centering element)	8...16 mm (8...10 mm)
	Square shaft	6...12.8 mm
	Min. drive shaft length	30 mm
	Max. shaft hardness	<300 HV

Air volume flow controller		
Type	3-position controller with hysteresis	
V _{max} , adjustable	resolution 1% / factory setting 100%	20%...120%
V _{min} , adjustable	resolution 1% / factory setting 0%	-20%...100%
V _n = f(dp _n), adjustable	resolution 0.01 / factory setting 1.00	1.0...3.16

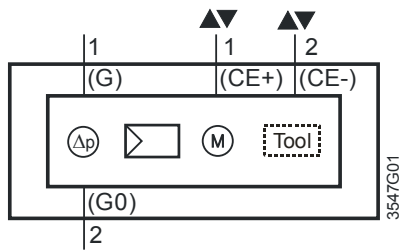
Differential pressure sensor		
	Connection tubes (Interior diameter)	3...8 mm
	Measuring range	0...500 Pa
	Operating range	0...300 Pa
Precision at 23 °C, 966 mbar and optional mounting position	Zero point	± 0.2 Pa
	Amplitude	± 4.5 % of the measured value
	Drift	± 0.1 Pa / Year
	Max. permissible operating pressure	3000 Pa
	Max. permissible overload on one side	3000 Pa

¹⁾ The documents can be downloaded from <http://siemens.com/bt/download>

Internal diagrams

The VAV compact controller is supplied with two prewired connecting and communication cables. All interconnected devices must be connected to the same G0.

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Tool = Configuration and maintenance interface
(Series E and later: 7-pin connector)

Power supply and communication cables

Core designation	Core color	Terminal code	Description
Cable 1: Power / black sheathing			
1	red (RD)	G	System voltage AC 24 V
2	black (BK)	G0	System neutral AC 24 V
Cable 2: Communication / green sheathing			
1	red (RD)	CE+	KNX CE+
2	black (BK)	CE-	KNX CE+

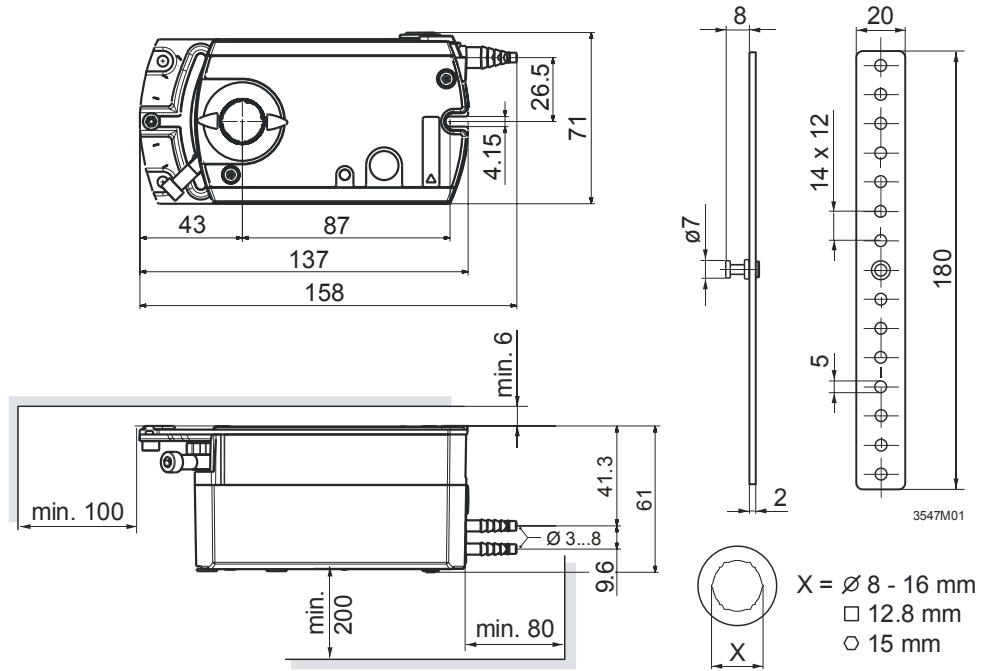
Note

The operating voltage at terminals G and G0 must comply with the requirements under SELV or PELV.

Safety transformers with twofold insulation as per EN 61558 required; they must be designed to be on 100 % of the time.

Dimensions

G..B181.1E/..



Measurements in mm

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