SIEMENS

3547



OpenAir™

VAV compact controller GDB181.1E/KN
KNX / PL-Link GLB181.1E/KN

Series E

- **Networked compact controller featuring KNX (S-mode / LTE-mode) and PL-Link capability for plants with variable air volume flow**
- **Integrated, highly precise differential pressure sensor, actuator as well as digitally configurable air volume controller**
- **Operating voltage AC 24 V**
- **Nominal torque 5 or 10 Nm; air damper angular rotation can be adjusted mechanically from 0° to 90°**
- **Can be configured as a stand-alone device per room or cascade control 1:1 pressure ratios; positive or negative pressure**
- **Pre-wired with a 0.9 meter power cable and 0.9 meter KNX cable**

Note

Please refer to “Technical Basics” P3547 for a comprehensive description of safety, engineering and commissioning notes as well as mounting instructions for VAV compact controllers.

Application

VAV compact controllers are primarily used for controlling a variable or constant air volume flow.

System environments:

- Building automation systems using the Siemens peripheral bus PL-Link (Desigo Total Room Automation)
- Building automation systems using KNX LTE-mode (Synco 700 Step 3 and newer)
- Building automation systems using KNX S-mode (third-party integration and freely programmable devices)

Application fields:

- Supply air control
- Extract air control
- Supply/extract cascade control with
  - Ratio control 1:1
  - Ratio control (positive/negative pressure)
  - Differential control (positive/negative pressure)
- Air dampers with a nominal torque of up to 5 or 10 Nm

VAV compact controllers are not suitable for environments where the air is saturated with sticky or fatty particles or contain aggressive substances.

Type summary

Type	*Torque*	*Application range*	*Operating voltage*
GDB181.1E/KN	5 Nm	0...300 Pa	AC 24 V
GLB181.1E/KN	10 Nm	0...300 Pa	AC 24 V

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

Equipment combinations

VAV compact controllers are KNX certified and may be connected to all KNX devices compatible with S-mode data points.

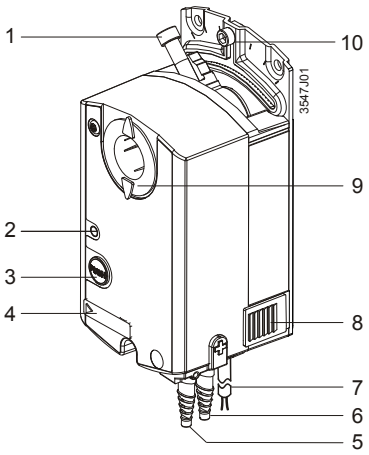
Device	*Type*	*Data sheet*
Controllers and room units		
Room thermostat with controller	RDG400KN	3192
Room thermostat	RDU341	3172
Universal controller	RMU7..	3144
Web server	OZW7..	5702
PL-Link automation station	PXC3..	9203
Tools for configuration and service		
Handheld tool	AST10*	5851
Interface converter	AST11	5852
PC software for service	ACS941 v3.0 or later*	5854
Service kit (ACS941 + AST11)	AST21	-

Tools for engineering and commissioning (partially suitable for device configuration)		
Tools for PL-Link	Desigo ABT / SSA	
Tool for KNX LTE-mode	Synco ACS790	
Tools for KNX S-mode	ETS3 / ETS4	

* AST 10 / ACS941 v2.x: limited functionality for VAV compact controllers

Design

Main device parts



1 Shaft attachment screw
2 LED
3 Push button
4 Configuration and maintenance interface (below cover)
5 Connection nozzle for measuring differential pressure in the VAV box
6 Connection nozzle for measuring differential pressure in the VAV box ("+": Side with higher pressure)
7 2 connecting cables (power and communications), 2-core each
8 Disengagement of gear
9 Rotation angle display
10 Rotation angle check screw

Human-Machine-Interface (HMI)

The HMI consists of an LED (1) and a push button (2).

Push button

Push button operation	*Description*
Short key press (<0.5 s)	Switch to programming mode or cease display of connection test results
Middle key press (>2 s and <20 s)	Execute connection test *(Note: Only available with PL-Link)*
Long key press (>20 s)	Reset to factory settings

LED state display

LED display	*Description*
off / dark	a) Device not connected to power source b) Device is connected to power source and operates without failure
orange (flashing) *(1x)*	Feedback for middle key press
orange (flashing)	Wait (connection test or reset to factory settings)
red	Connection test *not* successful
red	Device in programming mode
green	Connection test successful

Note

For further information on settings, operating modes, and engineering and commissioning workflows in the available system environments, please refer to “Technical Basics” P3547.

Settings and operating mode

Parameterization

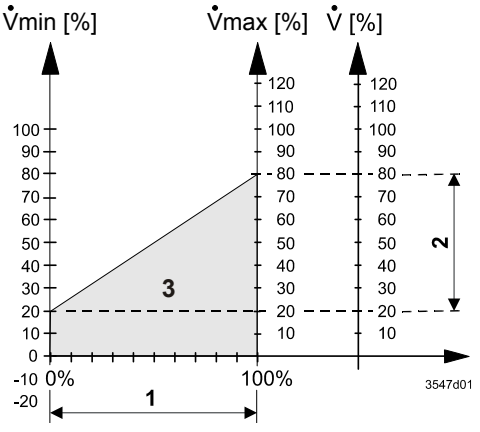
OEM generally provide the basic configuration to VAV compact controllers, especially the parameter $\dot{V}_n$. Configuration depends on the system environment were the VAV compact controllers are used (i.e. PL-Link, KNX LTE-mode, KNX S-mode). Overall system engineering and commissioning is based on this basic configuration; accomplished using tools listed under “equipment combinations” (p. 2).

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

Parameter	*Setting*	*Description*	*Siemens factory setting*
$\dot{V}_n$	**1…3,16**	Characteristic value for the air volume flow; set by the manufacturer (OEM)	**1**
$\dot{V}_{max}$	**20…120 %**	Maximum air volume flow	**100 %**
$\dot{V}_{min}$	**-20…100 %**	Minimum air volume flow	**0 %**
Dir	**r** or **L**	Air damper rotation (opening direction) **r** = Clockwise (CW) **L** = Counter clockwise (CCW)	**r**
ADP	**Off** or **on**	Standard mode for air damper position display (Mapping 0°...90° → 0…100 %) Adaptive mode for air damper position display (Mapping e.g. 0°…60° → 0…100 %)	**Off**
Altitude	**0…5000 m (Resolution 500 m)**	Altitude level for differential pressure sensor	**500 meters**

Variable air volume control (VAV)

VAV compact controllers operate in VAV mode when connected to the specified power supply. The setpoint signal determines the operating range $\dot{V}_{min}$ … $\dot{V}_{max}$.



1 Setpoint point
2 Actual value
3 Controlled area

Constant air volume control (CAV)

The VAV compact controllers can be operated in CAV mode by setting the setpoint value accordingly.

Commissioning

Commissioning variants

Three commissioning procedures are available.

System / network environment	*Engineering and commissioning tool(s)*
PL-Link	Desigo ABT, SSA
KNX LTE-mode	Synco ACS790
KNX S-mode	ETS3, ETS4

- Basic knowledge of the tools required.
- An interface converter, e.g. OCI700 required to connect a PC with USB interface to a KNX network,
- Number and type of parameters may vary depending on the system environment.

Commissioning requirements

- Prior to commissioning, all VAV compact controllers must be mounted according to the mounting instruction M3547 as well as all other devices as per the corresponding mounting instructions. All devices must be connected to the power supply and bus cabling.
- Power supply and bus cabling must be tested.

Operating mode and display

After power-up, the device can assume the following states:

State / desired behavior	*User action*	*Device response (LED)*
Functionality available in all system environments		
Power-up / device starts up	Connect device to power supply	LED is *orange* / goes off after power-up is completed
Faultless operation	none	LED is off
Set device to programming / addressing mode	Short key press (<0.5 s)	LED is *red* (no time limit)
Reset device to factory settings	Long key press (>20 s)	LED flashes *orange* until reset is completed
Additional functionality available in PL-Link environments only		
Execute connection test	Middle key press (>2 s and <20 s)	LED flashes *orange* Then (each for 60 seconds or prior cancellation by key press): a) LED is *green* → connection test successful b) LED flashes *red* (1s – interval) → connection test *failed*
Acknowledge connection test	Short key press (<0.5 s)	LED is off

PL-Link commissioning

Multiple VAV compact controllers can be connected simultaneously to the power supply or individually. For Plug&Play commissioning, the PL-Link capable controller must be preconfigured as per the recommended engineering and commissioning workflow described in Technical Basics P3547.

The PL-Link controller is online.
The VAV compact controllers are not connected to the power supply.

→ Simultaneously connect all VAV compact controllers to the power supply (or individually as applicable)
→ PL-Link controller and VAV compact controllers execute registration and address assignment. Configuration is uploaded from the controller to the VAV compact controllers.
→ Optional: Press middle key for connection test (>2 sec and <20 sec).

KNX LTE-mode commissioning

VAV compact controllers, KNX LTE-mode controller and operating units are connected to the power supply; ACS790 is started.

→ In ACS790, open *Applications / Device list*…
→ a) Set a VAV compact controller to addressing mode
(Push button on device → LED shines red)
b) In ACS790, click button "*Programming mode*" → *Address assignment* → enter physical address → click *"Write"*

or

a) Select a VAV compact controller from the device list by ID
(IDs are collected during mounting),
b) Double click the selected row to open the dialog box
"Address assignment",

→ Enter a physical address and short description for the selected VAV compact controller,
→ Click *"Write"* to close dialog box,
→ Repeat steps for all VAV compact controllers for commissioning.

Continue: Further configuration with ACS790.

KNX S-mode commissioning

For KNX S-mode, the general S-mode commissioning procedures apply for ETS3 or ETS4. The HMI (push button and LED) conforms to the KNX standard.

Ordering through the VAV box manufacturer (OEM)

As a rule, documentation provided by VAV box manufacturers (OEM) contains detailed information on VAV compact controller ordering information.

The OEM generally configures and assembles VAV compact controllers as VAV box units. This facilitates commissioning at the construction site considerably. Use service kit AST21 (PC software for service ACS941 and interface converter AST in a transport case) should changes nevertheless be required on site.

OEM always sets $\dot{V}_n$ (nominal air volume flow) as a matter of principle.

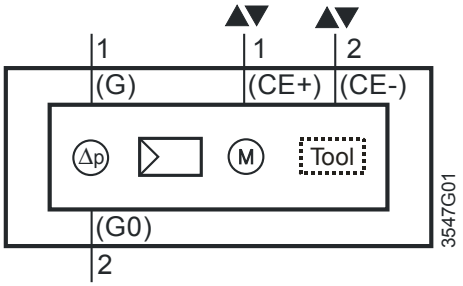
Technical Data

⚠ **Power supply AC 24 V** (SELV/PELV)	Operating voltage / frequency	AC 24 V ±20 % / 50/60 Hz
G (core 1, red) and G0 (core 2, black)	Power consumption at	
	Actuator holds	1 VA/0.5 W
	Actuator rotates	3 VA/2.5 W
Damper actuator	Nominal torque	5 Nm (GDB) / 10 Nm (GLB)
	Maximum torque	<7 Nm (GDB) / <14 Nm (GLB)
	Nominal rotation angle / maximum rotation angle	90° / 95° ±2°
	Running time for nominal rotation angle 90°	150 s (50 Hz) / 125 s (60 Hz)
	Direction of rotation (adjustable with **ACS941**)	Clockwise / counter clockwise
KNX-Bus	Connection type	KNX, TP1-256 (el. insulated)
	Bus load	5 mA
	Bus topology	Refer to Technical Basics P3547
Configuration and maintenance interface	Terminal strip	7-pin, grid 2.00 mm
Connection cable	Cable length	0.9 m
	Number of cores and cross-sectional area	2 x 0,75 mm^2
⚠ **Degree of protection and safety class**	Degree of protection acc. to EN 60529 (Refer to mounting instruction)	IP54
	Safety class acc. to EN 60730	III
Environmental conditions	Operation / transport	IEC 721-3-3 / IEC 721-3-2
	Temperature	0...50 °C / –25…70 °C
	Humidity (non-condensing)	<95% r.h. / <95% r.h.
Standards and Regulations	Product safety	
	Automatic electric controls for household and similar use	EN 60730-2-14 (mode of action type 1)
	Electromagnetic compatibility (EMC)	
	Immunity	IEC 61000-6-2
	Emissions	IEC 61000-6-3
	CE Conformity	
	EMC directive	2004/108/EC
	HBES/BACS directive	EN 50491-5-4
	C-Tick Conformity	
	Emissions	AS/NZS 61000-6-3
Dimensions	W x H x D	71 x 158 x 61 mm
Suitable drive shafts	Type of drive shaft	
	Round	8...16 mm
	Round, with centering element	8...10 mm
	Square	6...12.8 mm
	Min. drive shaft length	30 mm
	Max. shaft hardness	<300 HV
Weight	Without packaging	0.6 kg
Air volume controller	3-position controller with hysteresis	
	$\dot{V}_{max}$, adjustable (resolution 1 % / factory setting 100 %)	20…120 %
	$\dot{V}_{min}$, adjustable (resolution 1 % / factory setting 0 %)	-20…100 %
	$\dot{V}_n$, adjustable (resolution 0.01 / factory setting 1.00)	1…3,16
	$\dot{V}_n$ = 1 ≙ 300 Pa at nominal air volume flow	
	$\dot{V}_n$ = 3,16 ≙ 30 Pa at nominal air volume flow	
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

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.

Internal diagram
(Applies to all types)

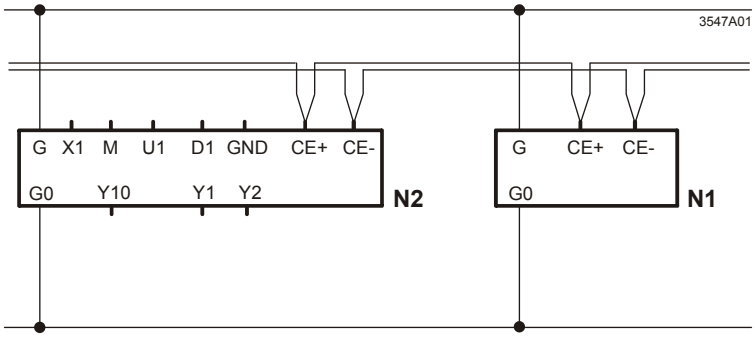


Tool = Configuration and maintenance interface (7-pin)

Power supply and bus cable (color coded and labeled)

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: Bus / green sheathing			
1	red (RD)	CE+	Bus (KNX / PL-Link)
2	black (BK)	CE-	Bus (KNX / PL-Link)

Wiring diagram VAV
Connection to the KNX TP1-Bus



N1 G..B181.1E/KN
N2 RDG400KN (Example of a VAV enabled room unit)

Application examples

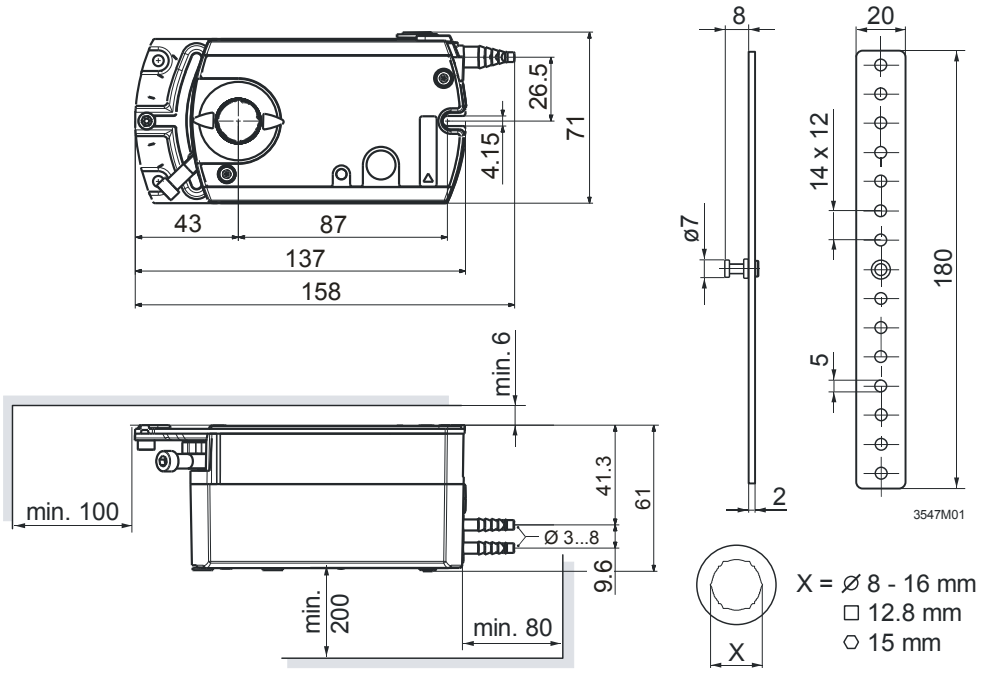
Please refer to the “Technical Basics” P3547 for VAV compact controller and to the Technical Basics on the attached devices for application examples.

Note

Terminal layout may differ for each device. Devices with twin-terminals or internally connected terminals may be encountered as well as bus connection in junction boxes. Please refer to the technical basic documentation for product specific information.

- 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



Measurements in mm

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