OpenAir™

VVS Compact Controllers

GDB181.1E/3
GLB181.1E/3

Serie B

- **VAV compact controllers for plants with variable or constant airflow**
- **Consisting of static differential pressure sensor, actuator and configurable digital air volume controller with P-control**
- **Operating voltage AC 24 V**
- **Nominal torque 5 or 10 Nm, angular rotation of air damper mechanically adjustable between 0 and 90°**
- **Optional configuration as a VAV compact controller or as a combined actuator / differential pressure sensor**
- **Prewired with a 0.9 m connecting cable**
- **Fully compatible with RCE84.1... and SQE92.1....**

Note

Please refer to the Technical Basics in document Z4634en for a detailed description as well as information on safety, engineering notes, mounting and commissioning

Use

Used primarily to control the room temperature in individual rooms and zones of ventilation and air conditioning plants working with variable or constant volumetric airflows, and the air volume is required as an auxiliary controlled variable[1)].

1) To keep constant the volumetric airflow on pressure fluctuations in the system

The controllers are used for:
- Supply air control
- Extract air control

- Supply / extract air cascade control with
  – ratio control 1 : 1
  – ratio control 1 ≠ 1 (over- / underpressure)
  – differential control 1 ≠ 1 (over- / underpressure)
- Air dampers with a nominal torque up to 5 or 10 Nm

Type summary

Type reference	Torque	Pressure range	Operating voltage
GDB181.1E/3	5 Nm	0..300 Pa	AC 24 V
GLB181.1E/3	10 Nm	0..300 Pa	AC 24 V

Accessories (optional)

Description	Type reference / part no.
Centring element, D-profile, ∅12 × 9 mm	**ASK78.4**
Centring element, round ½"	**ASK78.5**
Centring element, square 8 mm	**ASK78.6**
Centring element, square 10 mm	**ASK78.7**

For additional information about accessories and spares, refer to data sheet 4698.

Ordering and delivery

When ordering, please give type reference or part number of the unit or the accessories, e.g.: **GDB181.1E/3**
The following parts are delivered as separate items:
- Mounting bracket with two fixing screws
- Centring element for shaft diameters 8...10 mm (only for use with **GLB181.1E/3**).

The VAV compact controllers are supplied with a 0.9 m long, ready wired connecting cable.

Equipment combinations

Unit	Type reference	Data sheet
Room temperature controller	**RCU6...**	3046
POLYGYR™ and CLASSIC range		3551, 3390
TEC™ range		3601
DESIGO™ RX range:		38xx
Setting unit	**AST10**	5851
Interface converter	**AST11**	5852

Technical design

The VAV compact controller can be used with or without integrated air volume controller. The following parameters are available in the unit:

Parameter	Range	Factory setting
Function type	• **con** (VAV compact controller) • **3P** (combined actuator / differential pressure sensor)	**con**
$\dot{V}_n$ = correction factor for nominal volumetric airflow	1...2.55	1
$\dot{V}_{min}$ [1] = minimum volumetric airflow	−20...+100 %	0 %
$\dot{V}_{max}$ [1] = maximum volumetric airflow	20...120 %	100 %
Actuator rotary direction	Counter-clockwise / clockwise	Clockwise

1) The $\dot{V}_{min}$ and $\dot{V}_{max}$ percentage values refer to $\dot{V}_n$. If function type "3P" has been selected for the VAV compact controller, a value can be set, but it does not have any impact since the limit values are set on the controller (e.g. on TEC).

The parameters can be set as follows:

- With setting unit **AST10** via terminal YC with digital communication, or the service tool connector, or
- With a laptop equipped with calibration software **ACS931** and interface converter **AST11**, via terminal YC with digital communication, or the service tool connector.

Mode of operation as a VAV compact controller with DC 0...10 V control (e.g. with room temperature controller **RCU61...**)

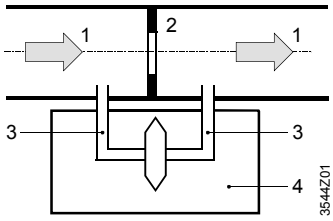
To use the VAV compact controller as an entity, parameter "Function type" must be set to "con" (factory setting). This setting can be made and checked with the **AST10** or the calibration software **ACS931**.

The VAV compact controller together with the **RCU61...** forms a room temperature cascade controller using the room temperature as the main controlled variable and the air volume as the auxiliary controlled variable.

With this type of control, the deviation of the room temperature determines the setpoint of air volume. The air volume is then maintained at the setpoint by the auxiliary control, that is, the pressure variations in the ductwork, which appear as a disturbance variable, have no impact on the air volume and, therefore, no impact on the room temperature.

The control mode for the auxiliary controlled variable "Air volume" is P (proportional).

The VAV compact controller acquires the actual value of the volumetric airflow via the differential pressure Δp by means of a membrane sensor. The differential pressure is converted electronically to a volumetric flow signal, which is made available at output U (core 9) in the form of a DC 0...10 V output signal (e.g. for volumetric airflow indication).



Legend

1 Actual value of volumetric airflow
2 Flow resistance in the duct (schematically)
3 Measuring line
4 Static (membrane) differential pressure sensor

Variable (VAV) or constant (CAV) air volume control

The use of input YC defines the type of air volume control.

The following tables show the impact of the kind of use of inputs Y… on the type of control and forced control.

VAV/CAV control with configuration "con"				
Configured actuator rotary direction	Counter-clockwise /clockwise	Counter-clockwise /clockwise	Counter-clockwise /clockwise	Counter-clockwise /clockwise
YC (core 8)	DC 0...10 V	DC 0...10 V	Open	Open
Y1 (core 6)	Open	G0	Open	G0
Y2 (core 7)	Open	G0	Open	G0
Type of control	**VAV** control with DC 0...10 V setpoint shift	**VAV** control with DC 0...10 V setpoint shift	**CAV** control at $\dot{V}_{min}$	**CAV** control at $\dot{V}_{max}$

VAV/CAV forced control with configuration "con"				
Configured actuator rotary direction	Clockwise	Counter-clockwise	Counter-clockwise	Clockwise
YC (core 8)	DC 0...10 V or open	DC 0...10 V or open	DC 0...10 V or open	DC 0...10 V or open
Y1 (core 6)	G0	G0	Open	Open
Y2 (core 7)	Open	Open	G0	G0
Forced control	Clockwise Damper fully open	Counter-clockwise Damper fully open	Clockwise Fully closed	Counter-clockwise Fully closed

VAV control

The DC 0…10 V signal at input YC is the compensating variable for the setpoint of the volumetric air volume. It determines the required volumetric airflow within the limits of $\dot{V}_{min}$ and $\dot{V}_{max}$.

CAV control

Depending on the circuitry (open / closed) of inputs Y1 and Y2, the required CAV level is maintained. When the input is open, the VAV compact controller maintains $\dot{V}_{min}$; when inputs Y1 and Y2 are closed, $\dot{V}_{max}$ is maintained.

Adjustment of nominal volumetric airflow ($\dot{V}_n$)

Using parameter $\dot{V}_n$, the box manufacturer can match the measurement range of the VAV compact controller to the respective nominal air volume of the air boxes.
100 % nominal air volume of the air box then corresponds to DC 10 V of the measurement range of the VAV compact controller. This adjustement can be checked at output U (core 9, pink).

Minimum and maximum limitation of air volume

With the aid of setting parameters $\dot{V}_{min}$ and $\dot{V}_{max}$, the air volume can be limited to a minimum and maximum.

Overpressure / underpressure setting

With supply / extract air control, a room over- or underpressure up to 20 % max. at equal duct cross sections and pressure ranges with the aid of parameters $\dot{V}_{max}$ and $\dot{V}_{min}$ of the cascade controller.

Compensation of different duct cross sections

With supply and extract air control, parameters $\dot{V}_{max}$ and $\dot{V}_{min}$ allow for duct compensation of max. 20 %.

Forced air damper control

The circuitry of signal inputs Y1 and Y2 enables the air dampers to fully open or fully close, independent of $\dot{V}_{max}$ and $\dot{V}_{min}$.

Complete shut-off of volumetric airflow

Complete shut-off of the airflow takes place via digital signal input Y2. If this input is connected to ground (G0) and if signal input Y1 is open, complete shut-off is provided without giving consideration to $\dot{V}_{min}$.
This is a signal triggered by an external switching contact (e.g. a DDC switching command, window switch, or similar).
A complete shut-off of volumetric flow also takes place at YC = 0 V and $\dot{V}_{min} \leq 0$ %

Mode of operation of combined actuator / differential pressure sensor with AC 24 V / 3-position control (e.g. by TEC or DESIGO™ RX controller)

To use the VAV compact controller as a combined actuator / differential pressure sensor, parameter "Function type" must be set to "3P".
This setting is to be made with the **AST10** or the calibration software **ACS931**.

To enable the parameter change to become active, the power supply (AC 24 V) must be briefly interrupted after the change.

With this function type setting also, the VAV compact controller acquires the actual value of the volumetric airflow in the air duct via the differential pressure ∆p with the help of its static differential pressure sensor. The differential pressure is converted electronically into an air volume signal which is made available at output U (core 9, pink) as a DC 0..10 V signal (actual value of volumetric airflow).

The control air volume controller of the VAV compact controller is deactivated.

Air damper control (3-position) is accomlished via signal inputs Y1 (core 6, violet) and Y2 (core 7, orange).

The following table shows the impact of the input circuitry on air damper control for function type "3P".

Actuator rotary direction with configuration " 3P "				
YC (core 8)	Open			
Y1 (core 6)	Open	G0	G0	Open
Y2 (core 7)	Open	Open	G0	G0
Effect	Standstill	Clockwise[1)]	Counter-clockwise[1)]	Counter-clockwise[1)]

1) Applies when parameter "Actuator rotary direction of air damper" is set to "Clockwise"; otherwise, the contrary applies

The VAV compact controller is designed for attachment to air damper drive shafts that are at least 30 mm long.
It consists of a base group and a two-sectional housing.
The base group consists of:

- A base plate made of steel with an air damper attachment mechanism for different shaft cross sections and diameters (refer to "Dimensions") and an angular rotation limiter.
- Maintenance-free spur gearing with a very low noise level.
- A magnetic hysteresis coupling with low contact power transmission and an actuator that is thus protected against locking and overload, even in continuous operation.

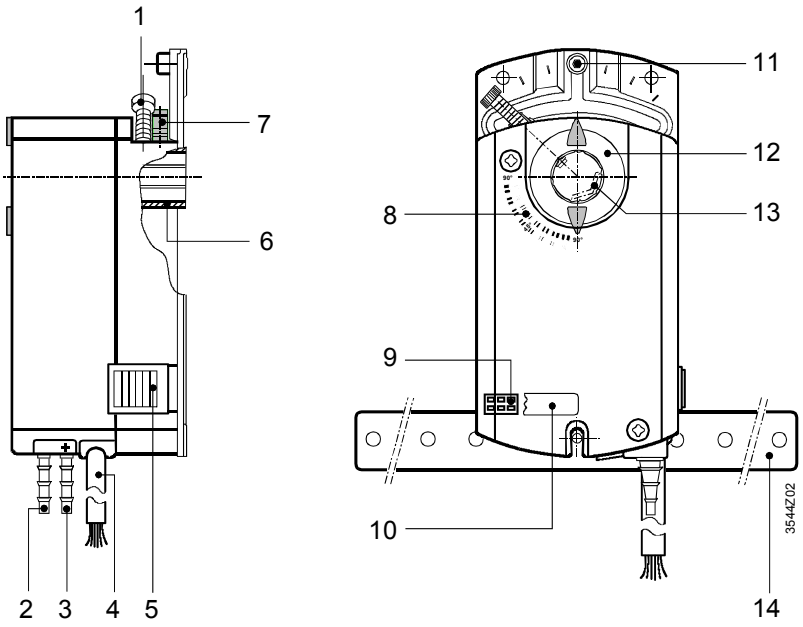
The housing is made of robust plastic. The cover may not be removed. The following components are located below the cover:

- The controller electronics.
- The membrane pressure sensor with electronic circuit.
- The actuator's synchronous motor.

For manual adjustment of the air dampers, the gear box can be disengaged via the gearing coupling mechanism on the side of the housing.

The electrical connection is made via a fixed connecting cable at the bottom of the housing. The cable ends are provided with ferrules.

Setting, operating and connecting elements



Legend

1 Fixing screw for damper drive shaft
2 Measuring element connection for a connecting tube (inside dia. 3...6 mm) to the nipple for the low pressure of the measuring cross on the box
3 Measuring element connection (+) for a connecting tube (inside dia. 3...6 mm) to the nipple for the high pressure of the measuring cross on the box
4 6-core connecting cable
5 Slider for disengaging the geartrain
6 Coupling sleeve (for damper drive shaft)
7 Adjusting lever with drive shaft fixing screw
8 Rotational angle scales (0...90° / 90...0°)
9 Socket for service tool (6-pole) for **AST10** and **AST11**
10 Cover for service tool socket
11 Limiter for angular rotation (4 mm hexagon socket head cap screws M5) infinetely adjustable between 0 and 90°
12 Position indicator for angle of rotation
13 Centring element for **GLB181.1E/3** (for 8…10 mm drive shaft dia.)
14 Mounting bracket

For the VAV compact controller **GLB181.1E/3** (10 Nm), a centring element made of hardened sinter steel is available (included in delivery as an accessory item).
This centring element ensures a rigid connection between damper drive shafts with a small diameter (8...10 mm) and the coupling sleeve and reduces linear movements of the VAV compact controller resulting from excentric movements.

The mounting bracket included in the delivery as an accessory item absorbes the reaction torque, even at maximum load.

Disposal

For environmentally compatible disposal, the larger plastic parts are labelled as per ISO/DIS 11 469.

Engineering notes

⚠

AC 24 V operating voltage is necessary for powering the VAV compact controller.

- The operating voltage must comply with the requirements for safety extra-low voltage (SELV) or protection by extra-low voltage (PELV)
- Use safety insulating transformers with double insulation; the transformers must be suited for 100 % on time.

All local safety regulations for sizing and protecting transformers must be complied with.

Electrical parallel connection of different types of VAV compact controller

Electrical connection in parallel of VAV compact controllers GDB181.1E/3 with GLB181.1/3 is permitted provided the operating voltage is within the required tolerance band. Voltage drops on the lines must be taken into consideration.

Note

The actuators may not be mechanically coupled.

Selection of the VAV compact controller type

Selection of the VAV compact controller type depends on several torque factors. After obtaining the damper torque rating (Nm/m^2) from the manufacturer and determining the damper area, calculate the total torque required to move the damper as follows:

Total torque = torque rating × damper area

Determine the required type of VAV compact controller from the table below:

If $\frac{\text{Total torque [Nm]}}{\text{SF}^{1)}}$	Then use type
≤5 Nm	**GDB181.1E/3** (5 Nm)
≤10 Nm	**GLB181.1E/3** (10 Nm)

1) Safety factor SF: when calculating, non-definable variables such as slight misalignment, damper age, etc., must be included as a safety factor.
We recommend a safety factor of 0.80 (or 80 % of the torque characteristic).

Caution, maintenance

The VAV compact controller may not be opened!
The controller is maintenance-free. If its housing is opened, the product guarantee becomes void.

Setting values

The setting values of $\dot{V}_n$, $\dot{V}_{max}$, $\dot{V}_{min}$, the selected function type ("con" or "3P") and the actuator rotary direction (clockwise or counter-clockwise) must be entered in the plant documentation.

Mounting notes

Mounting orientation	The mounting orientation is optional. It must be ensured however that the housing will be accessible (slider for disengaging the geartrain and service tool connection socket).
Service tool connection	The cable connection for YC must be accessible for the **AST10** setting unit or the **AST11** interface converter (e.g. connection terminal in the control panel).
Environmental conditions	Observe the permissible ambient temperature and the humidity (refer to "Technical data").
Centring element for **GLB181.1E/3** (10 Nm)	In the case of drive shaft diameters of 8…10 mm, the centring element is required to ensure a rigid mechanical connection. It must be fitted between damper drive shaft and coupling bushing as shown in the mounting instructions.
Manual adjustment	The actuator may be adjusted manually only when no voltage is applied.
Mechanical limitation of angle of rotation	Where required, the angle of rotation can be set by positioning the adjusting screw accordingly.
Mounting instructions	The VAV compact controller is delivered with mounting instructions.

Commissioning notes

- Check the mechanical settings as per the plant-specific requirements and especially to ensure that the dampers close tight
- Check the direction of rotation
- Use the red slider (while no voltage is supplied) to manually adjust the dampers or the actuator
- Fasten the actuator securely to avoid side load and blocking of the actuator
- Check the lines for differential pressure measurement for correct connection
- Setting unit **AST10** or the calibration software **ACS931** with interface converter **AST11** are required for checking or adjusting the setting values of $\dot{V}_n$, $\dot{V}_{max}$, $\dot{V}_{min}$, the function type ("con" or "3P") and the actuator rotary direction (counter-clockwise or clockwise).
  After detaching the **AST10** or **AST11** from the VAV compact controller, it takes one minute for YC, Y1 and Y2 to work as per the specifications
- After parameter setting "Function type" is changed, the power supply (AC 24 V) to the VAV compact controller must be cut off for a moment, enabling the change to become effective
- The sensor output signal is only correct after a maximum of two minutes following application of AC 24 V operating voltage or after interruption of power supply. During that period of time, the VAV compact controller makes a zero point calibration of the differential pressure sensor
- If the AST10 or AST11 is connected to YC, any cable for the DC 0…10 V (setpoint) signal connected to that output must be disconnected for the time the communication takes place!

Technical data

General data

Power supply (core 1 red and core 2 black)	Operating voltage	AC 24 V ±20 %
	Safety extra-low voltage (SELV) or protection by extra-low voltage (PELV) as per	HD 384
	Requirements of external safety insulating transformer (100 % on time)	EN 60 742
	Frequency	50 / 60 Hz
	Supply line fuse	max. 10 A
	Power consumption for sizing the transformer	6 VA/3.5 W
	Power consumption on	

	Holding	2 VA/1 W
	Running	3 VA/3 W
	Calibration mode	6 VA/3.5 W
	Running and calibration mode	7.5 VA/5.5 W
Signal inputs		
Volumetric airflow positioning signal or communication signal YC (core 8 grey)	Input voltage	DC 0…10 V
	Max. permissible input voltage	DC 35 V
	Limited to	DC 11 V
	For complete closure in VAV range, at $\dot{V}_{min} \leq 0$ %	DC -1.5 ... -0.2 V
	Input resistance	< 100 kΩ
	Neutral zone NZ	200 mV
	Protected against false wiring	max. AC 24 V
	Communication signal type	PPS2
Positioning signals Y1 (core 6 violet) and Y2 (core 7 orange)	Contact sensing	
	Contact open	DC 30 V contact voltage
	Contact closed	DC 0 V, 8 mA contact current
	Protected against false wiring	max. AC 24 V
Signal outputs		
Volumetric airflow measuring signal U (core 9 pink)	Output voltage "measuring signal"	DC 0…10 V
	Limited to	DC 12.8 V
	Max. output current	DC ±1 mA
	Protected against false wiring	Max. AC 24 V
Connection services tool	Terminal strip	2 x 3-pole, spacing 2.54 mm
Connecting cable	Cable length	0.9 m
	Number of cores	6
	Core cross section	0.75 mm^2
Protection and safety	Degree of protection of housing	IP54 as per IEC 529
	Safety class	III as per EN 60 730
Environmental conditions	Operation as per	IEC 721-3-3
	Climatic conditions	class 3K5
	Mounting location	interior, weather-protected
	Temperature	0....50 °C
	Humidity (non-condensing)	< 95 % r.h.
	Transport as per	IEC 721-3-2
	Climatic conditions	class 2K3
	Temperature	–25...+70 °C
	Humidity (non-condensing)	< 95 % r.h.
	Mechanical conditions	class 2M2
Norms and standards		
Product safety	Automatic electrical controls for household and similar use (type 1)	EN 60 730-2-14
Electromagnetic compatibility	Immunity	IEC 61 000-6-2
	Emissions	EN 50 081-1
CE conformity as per	EMC directive	89/336/EEC
	Low voltage directive	73/23/EEC
C-Tick conformity as per	Australian EMC Framework	Radio communication act 1992
	Radio Interference Emmission Standard	AS / NZS 3548
Dimensions	W x H x D	68 x 137 x 59.5 mm
Weight	Without packaging	0.54 kg

Actuator

Mechanical data	Torques of **GDB181.1E/3**	
	Nominal torque	5 Nm
	Min. holding torque (with / without operating voltage)	> 5 Nm
	Max. torque	< 7 Nm
	Torques of **GLB181.1E/3**	
	Nominal torque	10 Nm
	Min. holding torque (with/without operating voltage)	> 10 Nm
	Max. torque	< 14 Nm
	Nominal angle of rotation (with position indication)	90°

	Max. angle of rotation (mechanical limitation)	95° ±2°
	Running time for nominal angle 90°, motor operation at 50/60 Hz	150 s / 125 s
	Periodic switch-on time of the motor on damper blocking	after 24 h each
	Actuator rotary direction (can be selected with **AST10** or **ACS931**)	clockwise / counter-clockwise
	Mechanical life	10^5 cycles
Suitable damper drive shafts	Cross sectional area	
	Round	8...16 mm
	Round, with centring element (only for **GLB181.1E/3**)	8...10 mm
	Square	6...12 mm
	Min. shaft length	30 mm
	Max. shaft hardness	<300 HV
Controller	3-position controller with hysteresis	
	Max. air volume $\dot{V}_{max}$ (adjustable)	20...120 %
	Min. air volume $\dot{V}_{min}$ (adjustable)	–20...+100 %
	Nominal air volume $\dot{V}_n$ correction factor	1.00...2.55
Sensors	Measurement range	refer to ”Type summary”
	Accuracy across 2...100 % of the pressure range	
	at 25 °C, $\dot{V}_n$ = 1 and any mounting position	±2.5 % of measurement range
	Time constant	1 s
	Max. permissible operating pressure	3000 Pa
	Max. permissible side load	3000 Pa

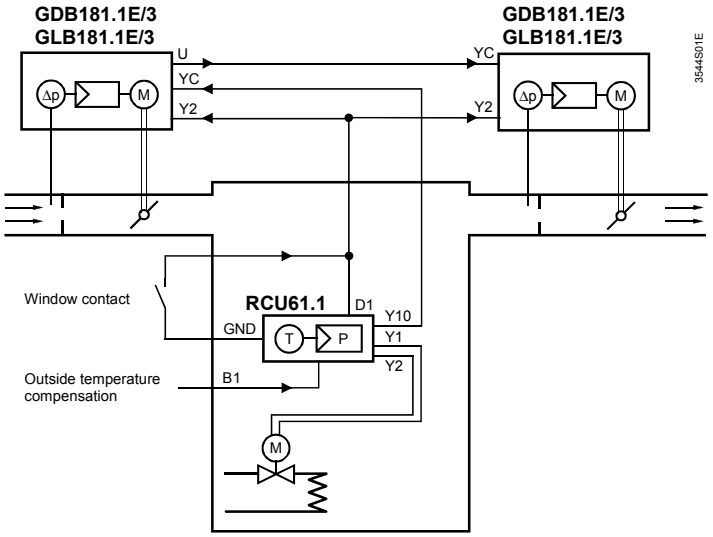
Plant examples

Note

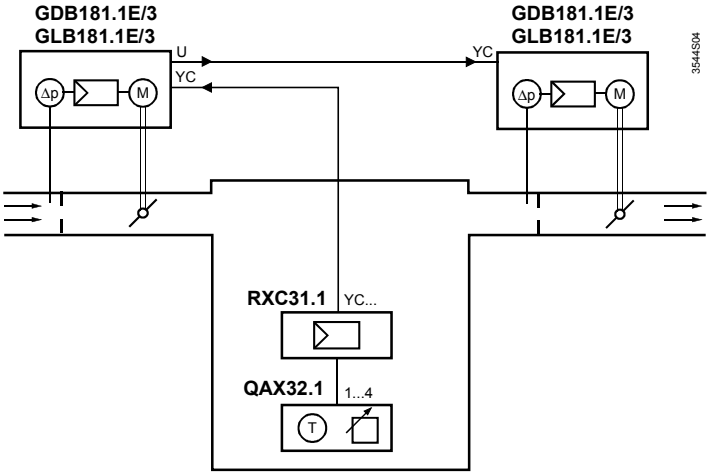
The illustrations only show the basic connections of signal lines. Switch-off functions and manipulations are not part of the illustrations as they differ from plant to plant.

Plant example 1
Function type "con": control loop without communication (DC 0...10 V control by room temperature controller RCU61.1)

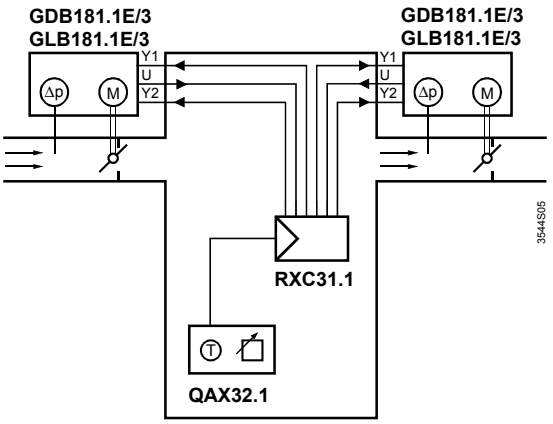
If a window switch connected to input Y2 (core 7) of the **GDB... / GLB...** or D1 of the **RCU61.1**, is open, the meaning is the following: the window is closed so that comfort operation is required. On an application with full shut-down of the volumetric airflow, input Y2 (core 7) of the main controller and secondary controller must be connected.



Plant example 2
Function type "con": control loop with communication. (DC 0...10 V control by DESIGO™ RX room temperature controller combination)



Plant example 3
Function type "3p": 3-position control by communicating individual room controller (here with DESIGO™ RXC31.1)

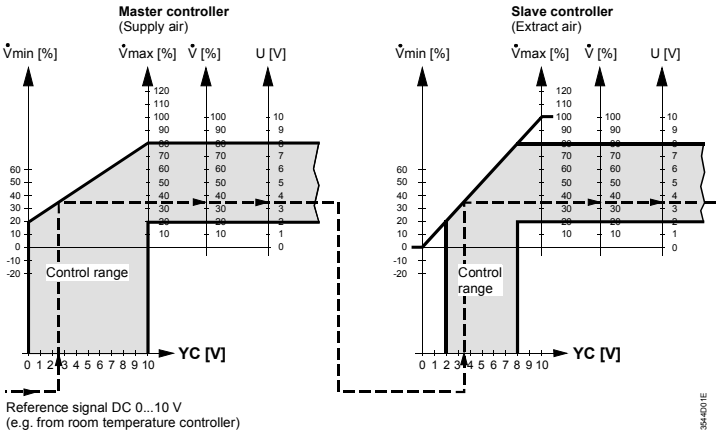


Setting examples

Setting example 1

VAV differential pressure control 1 : 1

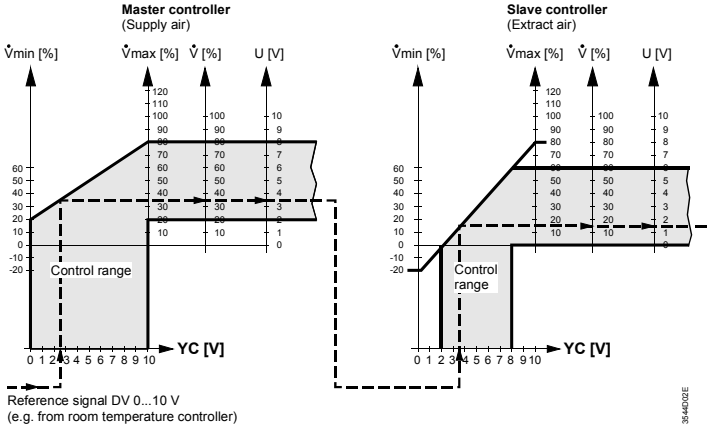
Master (supply air): $\dot{V}_{min}$ = 20 %, $\dot{V}_{max}$ = 80 %, $\dot{V}_n$ = 1
Slave (extract air): $\dot{V}_{min}$ = 0 %, = $\dot{V}_{max}$ 100 %, $\dot{V}_n$ = 1
Reference signal: Y20 = 2.5 V
Result: $\dot{V}_{master}$ = 35 %, $\dot{V}_{slave}$ = 35 %



Setting example 2

VAV differential pressure control 1 ≠ 1, with 20 % room overpressure

Master (supply air): $\dot{V}_{min}$ = 20 %, $\dot{V}_{max}$ = 80 %, $\dot{V}_n$ = 1
Slave (extract air): $\dot{V}_{min}$ = –20 %, $\dot{V}_{max}$ = 80 %, $\dot{V}_n$ = 1
Reference signal: Y20 = 2.5 V
Result: $\dot{V}_{master}$ = 35 %, $\dot{V}_{slave}$ = 15 %



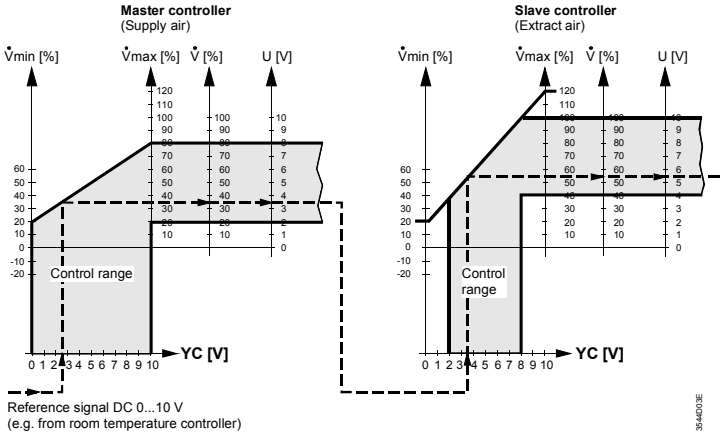
Setting example 3 **VAV differential pressure control 1 ≠ 1, with 20 % room underpressure**

Master (supply air): $\dot{V}_{min}$ = 20 %, $\dot{V}_{max}$ = 80 %, $\dot{V}_n$ = 1

Slave (extract air): $\dot{V}_{min}$ = 20 %, $\dot{V}_{max}$ = 120 %, $\dot{V}_n$ = 1

Reference signal: Y20 = 2.5 V

Result: $\dot{V}_{master}$ = 35 %, $\dot{V}_{slave}$ = 55 %



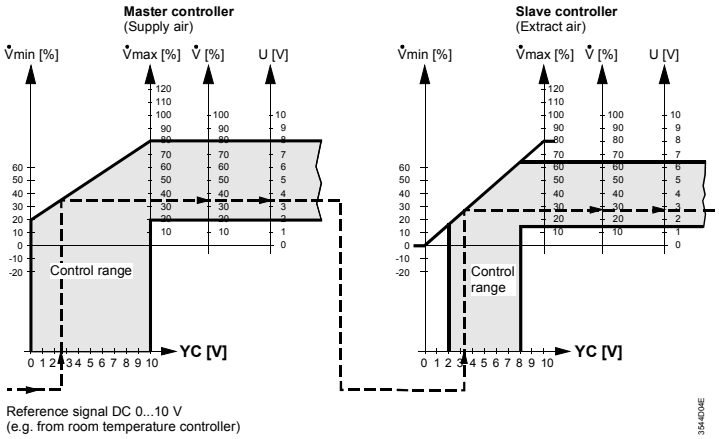
Setting example 4 **VAV relational control 1 ≠ 1,**
with increasing room overpressure in proportion to the supply air volume

Master (supply air): $\dot{V}_{min}$ = 20 %, $\dot{V}_{max}$ = 80 %, $\dot{V}_n$ = 1

Slave (extract air): $\dot{V}_{min}$ = 0 %, $\dot{V}_{max}$ = 80 %, $\dot{V}_n$ = 1

Reference signal: Y20 = 2.5 V

Result: $\dot{V}_{master}$ = 35 %, $\dot{V}_{slave}$ = 28 %



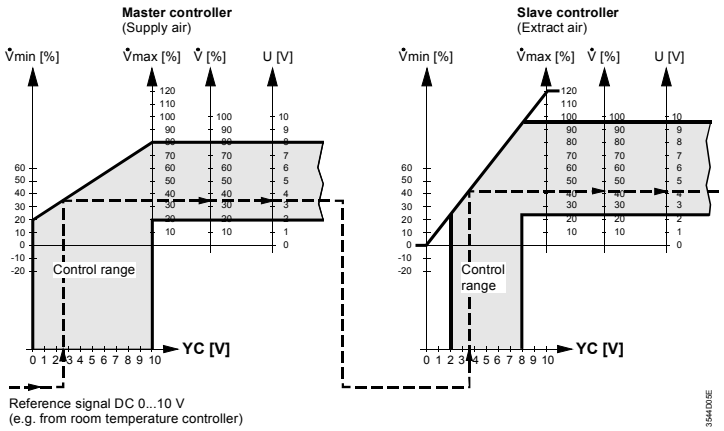
Setting example 5 **VAV relational control 1 ≠ 1,**
with increasing room underpressure in proportion to the supply air volume

Master (supply air): $\dot{V}_{min}$ = 20 %, $\dot{V}_{max}$ = 80 %, $\dot{V}_n$ = 1

Slave (extract air): $\dot{V}_{min}$ = 0 %, $\dot{V}_{max}$ = 120 %, $\dot{V}_n$ = 1

Reference signal: Y20 = 2.5 V

Result: $\dot{V}_{master}$ = 35 %, $\dot{V}_{slave}$ = 42 %



Legend for setting examples 1 to 5

$\dot{V}$	Air volume
$\dot{V}_n$	Nominal air volume
$\dot{V}_{min}$	Minimal air volume
$\dot{V}_{max}$	Maximum air volume
$\dot{V}_{master}$	Air volume of the supply air controller (master)
$\dot{V}_{slave}$	Air volume of the extract air controller (slave)
Y	DC 0...10 V input signal (air volume setpoint)
UC	DC 0...10 V output signal (air volume actual value)

Actual value formula

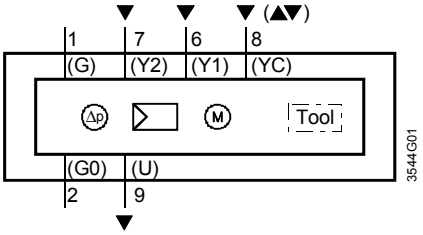
$$\text{Actual value [\%]} = \frac{\text{Setpoint [\%]} \times (\dot{V}_{max} - \dot{V}_{min})\ \text{[\%]}}{100\ \text{[\%]}} + \dot{V}_{min}\ \text{[\%]}$$

$$\text{Actual value [V]} = \frac{\text{Setpoint [V]} \times (\dot{V}_{max} - \dot{V}_{min})\ \text{[V]}}{10\ \text{[V]}} + \dot{V}_{min}\ \text{[V]}$$

Diagrams

The VAV compact controllers are supplied with a fixed, prefitted connecting cable. The connected units must be applied to the same G0.

Internal diagram
(applies to all types)



Legend

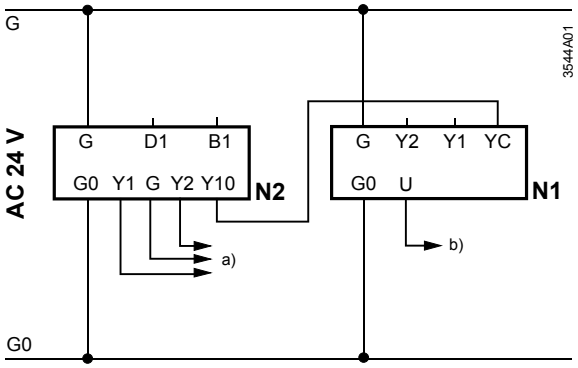
All wires of the connecting cable are colour-coded and labelled:

Wire labelling	Colour of core	Siemens terminal code	Meaning
1	Red (RD)	G	Live AC 24 V
2	Black (BK)	G0	System neutral AC 24 V
6	Violet (VT)	Y1	Positioning signal "Actuator rotary direction" (G0 switched), depending on the setting of **AST10** or **ACS931** (factory setting = clockwise)
7	Orange (OG)	Y2	Positioning signal "Actuator rotary direction" (G0 switched), depending on the setting of **AST10** or **ACS931** (factory setting = counter-clockwise)
8	Grey (GY)	YC	Air volume positioning signal DC 0 ... 10 V (setpoint) or communication signal when setting unit **AST10** or **AST11** is connected.
9	Pink (PK)	U	Air volume measuring signal DC 0 ... 10 V (actual value)

Tool = service tool socket (6-pole)

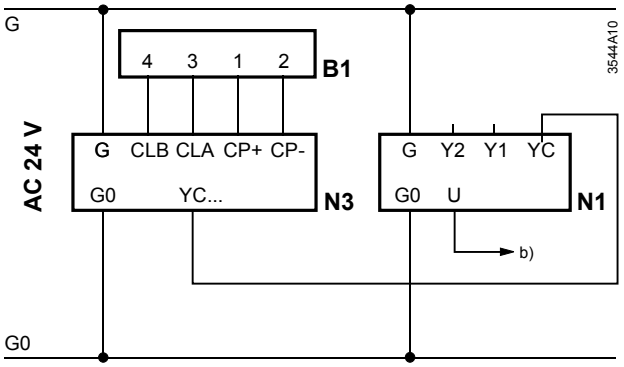
Connection diagram 1

Control loop without communication, e.g. with **GDB181.1/E3** or **GLB181.1/E3**, function type "con" and room temperature controller **RCU61.1**



Connection diagram 2

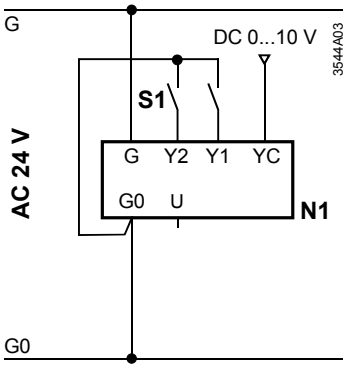
Control loop with communication, e.g. with **GDB181.1/E3** or **GLB181.1/E3**, function type "con" and room temperature controller DESIGO™ **RXC31.1**



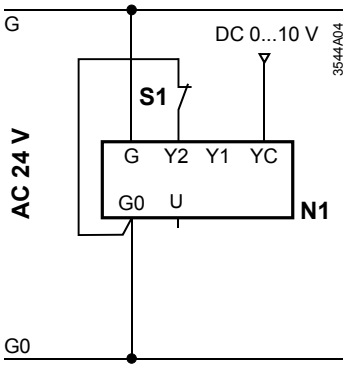
Connection diagrams 3a to 3c

VAV supply air or extract air control (examples)

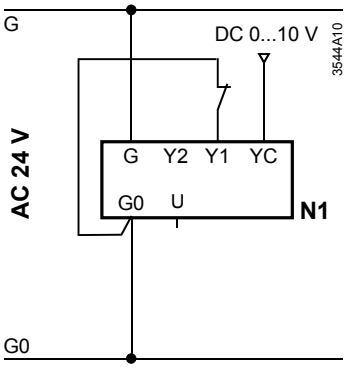
3a: modulating control $\dot{V}_{min}$ and $\dot{V}_{min}$



3b: modulating control between $\dot{V}_{max}$ and $\dot{V}_{min}$ and complete closure



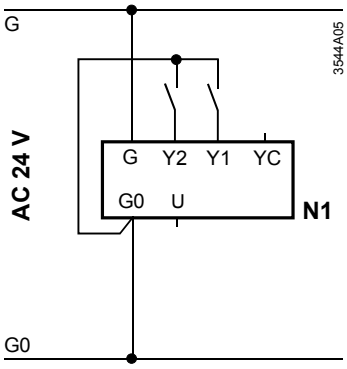
3c: modulating control between $\dot{V}_{min}$ and $\dot{V}_{max}$ and complete opening



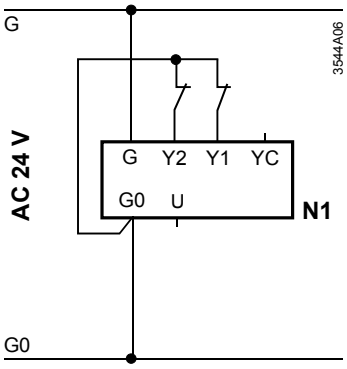
Connection diagrams 4a to 4c

CAV supply air or extract air control (examples)

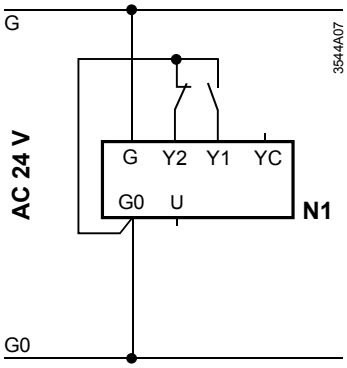
4a: control to $\dot{V}_{min}$ value



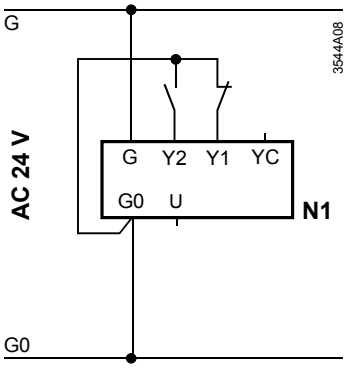
4b: control to $\dot{V}_{max}$ value



4c: complete closure



4d: complete opening



Legend for connecting diagrams 1 to 4

B1 Room unit **QAX32.1**

N1 VAV compact controller **GDB181.1/3** or **GLB181.1/3**

N2 Room temperature controller **RCU61.1**

N3 Room temperature controller DESIGO™ **RXC31.1**

S1 Window switch (window closed = switch open)

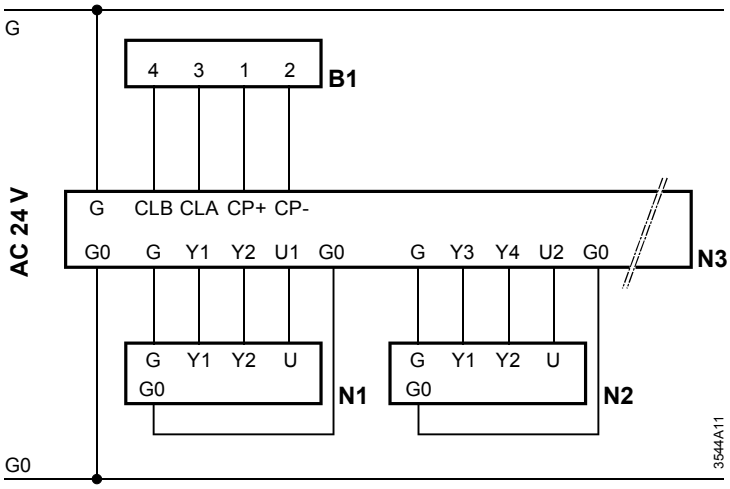
a) To actuator for "Heating"

b) To the slave controller

- The operating voltage on terminals G and G0 must comply with the requirements for safety extra-low voltage (SELV) as per EN 60 730.
- Use safety insulating transformers with double insulation in accordance with EN 60 742; the transformers must be suited for 100 % on-time.

Connection diagram 5

Supply air / extract air control , e.g. with **GDB181.1/E3** or **GLB181.1/E3**, function type "3p" and room temperature controller DESIGO™ **RXC31.1**



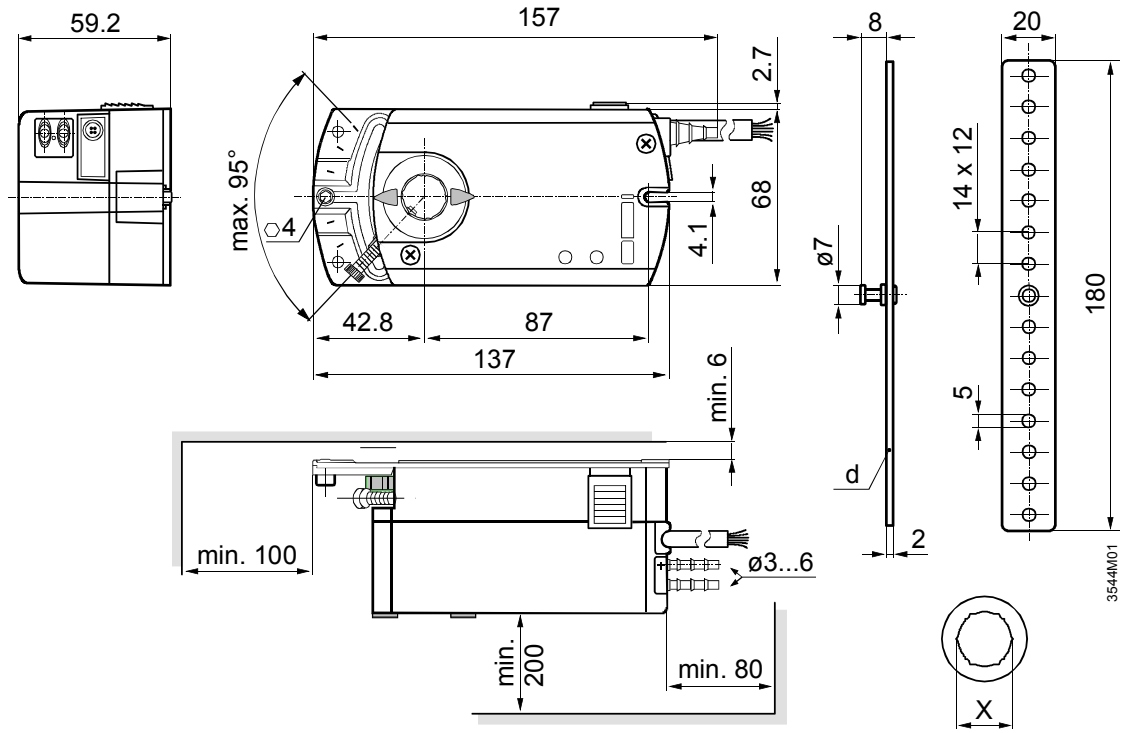
Legend for connection diagram 5

N1 VAV compact controller **GDB181.1E/3** or **GLB181.1E/3** (supply air)
N2 VAV compact controller **GDB181.1E/3** or **GLB181.1E/3** (extract air)
N3 Room temperature controller DESIGO™ **RXC31.1**
B1 DESIGO™ room unit, e.g. **QAX32.1**

⚠

- The operating voltage on terminals G and G0 must comply with the requirements for safety extra-low voltage (SELV) as per EN 60 730.
- Use safety insulating transformers with double insulation in accordance with EN 60 742; the transformers must be suited for 100 % on-time.

Dimensions



d = mounting bracket

X = **GLB181.1E/3**
⌀ 10 - 16 mm
□ 12.8 mm
⬡ 15 mm

X = **GDB181.1E/3**
⌀ 8 - 16 mm
□ 12.8 mm
⬡ 15 mm

Dimensions in mm