

Active chilled beam with KNX PL-Link VAV controller, cooling coil and hot water radiator on triac output

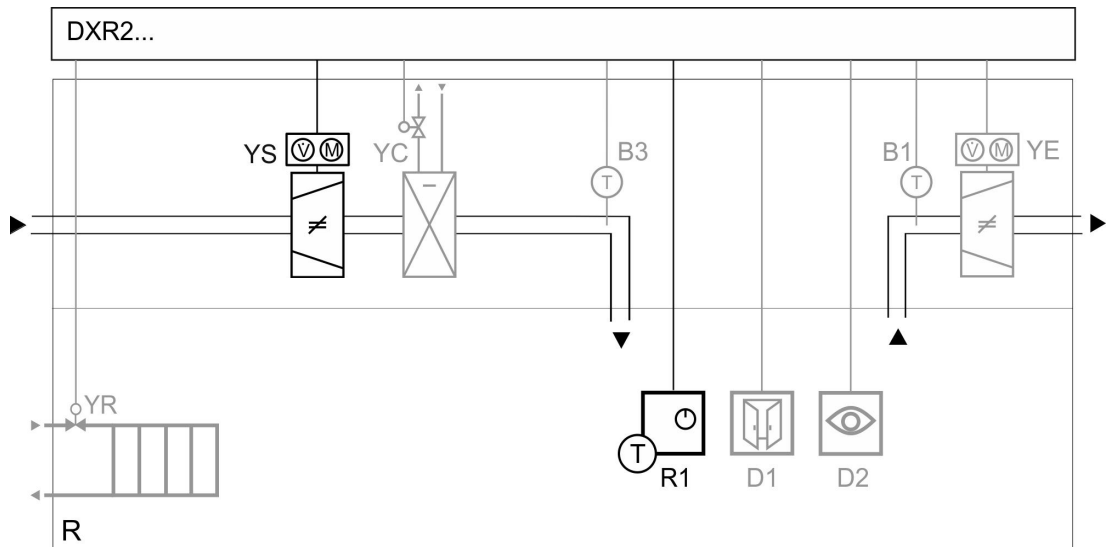
DXR2.E18-101A

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- Supply and extract air volume control with compact KNX PL-Link VAV controller
- Room temperature control
- Air quality control
- Heating with LTHW radiator on triac output
- Cooling with active chilled beam on triac output
- Downdraft compensation
- Room temperature and rapid ventilation operation via KNX PL-Link room operator unit with temperature, air quality and relative humidity measurement

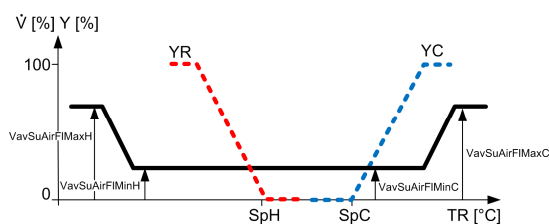
Plant diagram



DXR2...	Room automation station	R1	Room operator unit with temperature sensor
B1	Extract air temperature sensor	YC	Cooling coil valve
B3	Supply air temperature sensor	YE	Extract air control
D1	Window contact	YR	Radiator valve
D2	Presence detector	YS	Supply air control
R	Room		

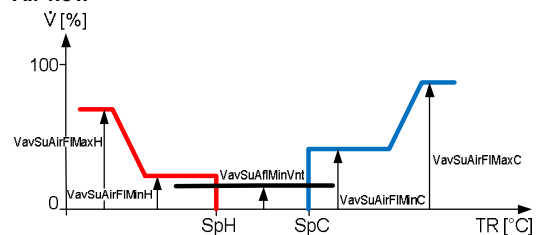
Function diagrams

Heating and cooling valve



SpC	Effective cooling setpoint
SpH	Effective heating setpoint
TR	Room temperature
V	Volume flow rate
VavSuAfMinVent	Min. air flow ventilation
VavSuAirFIMaxC	Max. volume, cooling

Air flow



VavSuAirFIMaxH	Max. volume, heating
VavSuAirFIMinC	Min. volume, cooling
VavSuAirFIMinH	Min. volume, heating
Y	Output signal
YC	Cooling valve
YR	Radiator valve

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Description of functions

Basic functions

- PID control for supply VAV, temperature and air quality.
- The temperature and air quality (CO₂) is measured in the room operator unit.
- The application allows customers to adjust the room temperature setpoints and rapid ventilation via the room operator unit.
- Display of room air quality on room unit.
- The operating modes are Comfort, Pre-Comfort, Economy and Protection.
- The air flow for heating and cooling is operated in sequence to the valves. Parallel operation can be configured.
- Supply VAV actuator on KNX PL-Link.

Auxiliary functions

- Rapid ventilation.
- Air volume flow tracking for positive and negative room air pressure.
- Air supply functions to coordinate demand signals for pressure optimized fan control.
- Green Leaf (RoomOptiControl) function.
- Multisegment use of DXR2 automation stations with VAV application.
- The application allows for control via centralized commands (e.g. scheduler program for room operating mode).
- Central optimum start control provides best room comfort at the start of occupancy.
- Central operation or reset of setpoints, timed valve kick function or outside temperature dependent heating limit.
- Central override functions for valves.
- Seasonal compensation of room temperature setpoints.

Options

- Extract VAV actuator on KNX PL-Link.
- PID control for LTHW radiator heating.
- Cooling active chilled beam with 3-position valve controlled by triac outputs.
- DOWNDRAFT compensation.
- Outside temperature (for downdraft compensation) distributed over BACnet.
- Optimal energy efficiency by including the option for room/supply air cascade control, presence detector or window contact.
- Optional system alarms displayed on the management station notify building operators of possible faults.
- Optional trends can be activated for room sensors.

Variants

- PWM constant (incl. spring return) or PWM thermal control can be selected for valves.
- Room operator unit and sensor variants:
 - KNX PL-Link wall-mount sensor
 - KNX PL-Link flush-mount room operator unit
 - KNX PL-Link flush-mount sensors
 - Analog extract air temperature sensor
- Presence can be detected by KNX PL-Link sensor or binary sensor.

Siemens devices	Legend	Type of unit	Data sheet	Product No.	Qty.
	DXR2...	Compact room automation station, BACnet/IP, 24 V, DIN housing, 2 DI, 4 UI, 8 DO triacs, 4 AO 0...10 V	N9205	DXR2.E18-102A	1
	R1	KNX PL-Link room operator unit with sensors for temperature, humidity, CO ₂ , segmented backlit display, touchkeys	N1602	QMX3.P74	1
	YS	VAV compact controller KNX PL-Link, AC 24 V, 5 Nm, 150 s, 300 Pa	N3547	GDB181.1E/KN	1

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DXR2.E18-101A

DXR2.E18-102A

Optional ¹⁾	Legend	Type of unit	Data sheet	Product No.	Qty.
B1		Cable temperature sensor PVC 2 m, LG-Ni1000	N1831	QAP22	1
B3		Cable temperature sensor PVC 2 m, LG-Ni1000	N1831	QAP22	1
D1		Door/window contact, white	2)	S 290/11	3)
D2		KNX PL-Link presence detector with brightness sensor	2)	UP 258D12	1 - 4
YE		VAV compact controller KNX PL-Link, AC 24 V, 5 Nm, 150 s, 300 Pa	N3547	GDB181.1E/KN	1
YC		2-port, 3-port valve or 3-port valves with bypass, PN16	N4847	V..P47..	1
		Motorized 3-positioning actuator for V..P47.., AC 24 V	N4864	SSP81..	1
YR		2-port, 3-port valve or 3-port valves with bypass, PN16	N4847	V..P47..	1
		Motorized 3-positioning actuator for V..P47.., AC 24 V	N4864	SSP81..	1

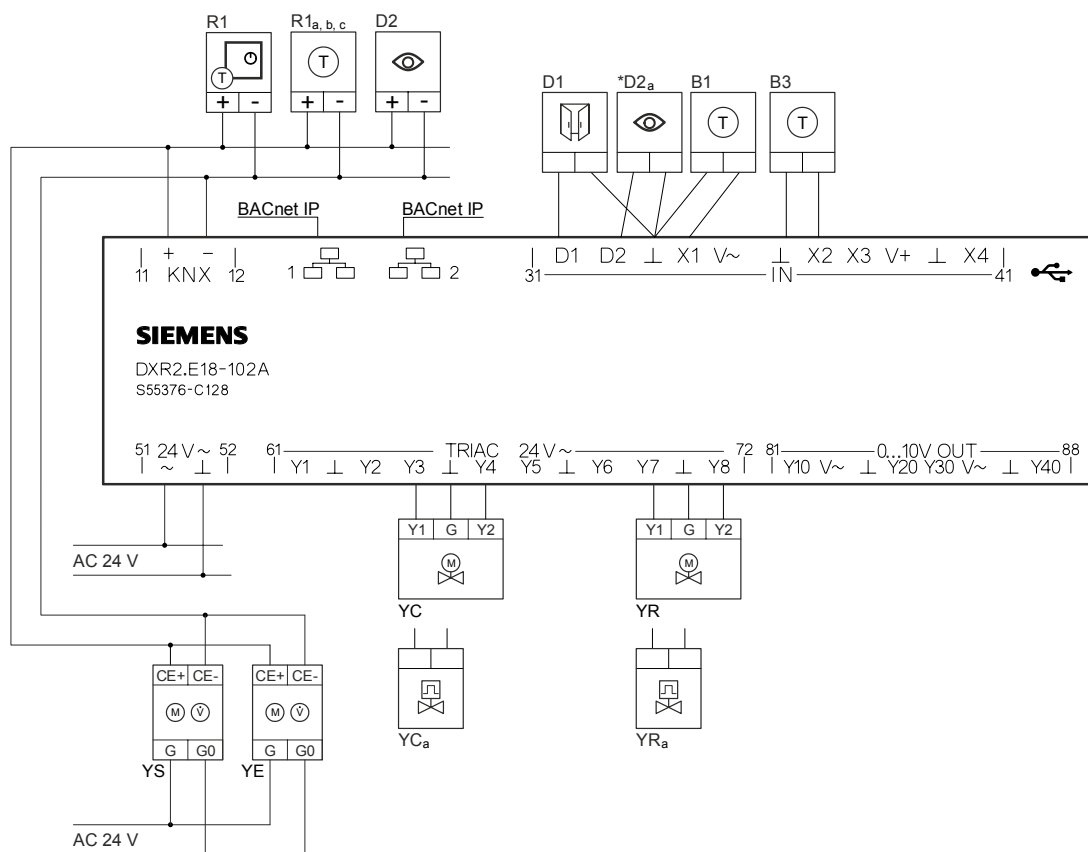
¹⁾ Can be combined according to available on-board I/Os on controller.

²⁾ Further documents on www.siemens.com/gamma-td.

³⁾ Type of operation (NO or NC). Multiple devices of the same type can be connected.

Variants	Legend	Type of unit	Data sheet	Product No.	Qty.
R1 _a		KNX PL-Link wall-mount room sensors	N1602	QMX3.P70	1
R1 _b		KNX PL-Link flush-mount room operator unit	N1601	QMX3.P36	1
R1 _c		KNX PL-Link flush-mount room sensors	N1411	AQR253... AQR257...	1
YC _a		2-port, 3-port valve or 3-port valves with bypass, PN16	N4847	V..P47..	1
		Thermal actuator, AC/DC 24 V, NO, 2P, 1 m	N4884	STP73	1
YR _a		2-port, 3-port valve or 3-port valves with bypass, PN16	N4847	V..P47..	1
		Thermal actuator, AC/DC 24 V, NO, 2P, 1 m	N4884	STP73	1

Connection diagram



*3rd party device

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DXR2.E18-101A

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**Application
configuration**

	Equipment	Values/Range	Template settings
KNX PL-Link devices	Room operator unit device 1	QMX3.P02, QMX3.P34, QMX3.P36, QMX3.P37, QMX3.P74	QMX3.P74
	Supply air VAV device	GDB181.1E/KN GLB181.1E/KN	GDB181.1E/KN

**Optional
configuration**

	Equipment	Values/Range	Template settings
On-board output	Cooling coil valve position	Water; Y3, Y4; 3-position Water; Y3; Pulse width modulation thermal Water; Y3; Pulse width modulation spring return Water; Y20; 0...10 V Chilled beam active; Y3, Y4; 3-position Chilled beam active; Y3; Pulse width modulation thermal Chilled beam active; Y3; Pulse width mod.spring return Chilled beam active; Y20; 0...10 V	Chilled beam active; Y3, Y4; 3-position
	Radiator valve position	Water; Y3, Y4; 3-position Water; Y7, Y8; 3-position Water; Y3; Pulse width modulation thermal Water; Y7; Pulse width modulation thermal Water; Y3; Pulse width modulation spring return Water; Y7; Pulse width modulation spring return Water; Y20; 0...10 V Water; Y40; 0...10 V Electric 1-stage; Y3; Normally open Electric 1-stage; Y7; Normally open Electric modulating; Y3; Pulse width modulation constant period Electric modulating; Y7; Pulse width modulation constant period Electric modulating; Y20; 0...10 V Electric modulating; Y40; 0...10 V	Water; Y7, Y8; 3-position
KNX PL-Link devices	Extract air VAV device	GDB181.1E/KN GLB181.1E/KN	GDB181.1E/KN
On-board input	Room temperature (B1)		X1; LG-Ni1000
	Supply air temperature (B3)		X2; LG-Ni1000
	Presence detector 2 (D2 _a)		D2; Normally open
	Window contact (D1)		D1; Normally closed
KNX PL-Link devices	Sensor device 1...4 (D2)		JP 258D12

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DXR2.E18-101A

DXR2.E18-102A

Default values

	Parameter	Values/Range	Basic setting
Temperature setpoints	Cooling setpoint for Comfort	0 ... 50 °C	24 °C
	Delta cooling setpoint for Pre-comfort	0 ... 10 K	1 K
	Cooling setpoint for Economy	0 ... 50 °C	35 °C
	Cooling setpoint for Protection	0 ... 50 °C	40 °C
	Heating setpoint for Comfort	0 ... 50 °C	21 °C
	Delta heating setpoint for Pre-comfort	0 ... 10 K	1 K
	Heating setpoint for Economy	0 ... 50 °C	15 °C
	Heating setpoint for Protection	0 ... 50 °C	12 °C
Ventilation Control	Setpoint room air quality for comfort	0 ... 2000 ppm	900 ppm
	Setp. room air quality for pre-comfort	0 ... 2000 ppm	1100 ppm
	Setpoint room air quality for economy	0 ... 2000 ppm	1500 ppm
	Setpoint room air quality for protection	0 ... 2000 ppm	1500 ppm
Supply air VAV	Supply air VAV max.air vol.flow f.cool	0 ... 10'000 m ³ /h	100 m ³ /h
	Supply air VAV min.air vol.flow f.cool	0 ... 10'000 m ³ /h	50 m ³ /h
	Supply air VAV max.air vol.flow f.heat	0 ... 10'000 m ³ /h	100 m ³ /h
	Supply air VAV min.air vol.flow f.heat	0 ... 10'000 m ³ /h	50 m ³ /h
	Supply air VAV min.air vol.flow f.vent.	0 ... 10'000 m ³ /h	0 m ³ /h
Room operator unit	Room unit, display temperature	None Display room temperature	Display room temperature
	Room unit, display windows status	Yes, No	No
	Room unit, display air quality	None Display room air quality	Display room air quality
	Room unit, air quality display	Numeric (in ppm) Symbolic (with the symbols +, ++, and +++) Textual (Poor, Ok, Good)	Textual
	Room unit, display heat./cool. status	Yes, No	Yes
	Enable operation: room temp. setpoint	Yes, No	Yes
	Room unit, room temp. setpoint display	Absolute temperature setpoint Relative setpoint shift	Relative setpoint shift
	Enable operation: fan speed setpoint	Yes, No	Yes
	Enable operation: presence button	Yes, No	No
	Enable operation: temporary Comfort	Yes, No	No
	Enable operation: room op. mode	Yes, No	No
	Enable operation: Green Leaf	Yes, No	Yes

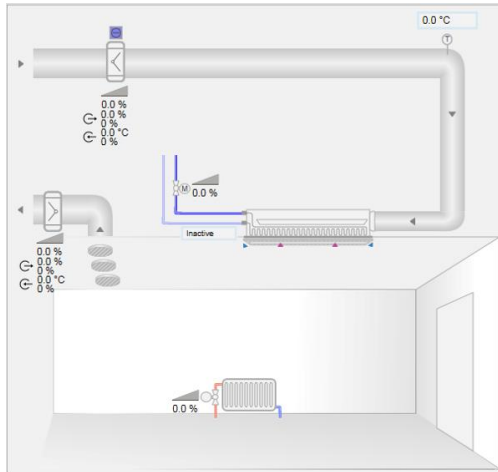
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Engineering

- ABT Site engineering tool is required to configure the DXR2 automation stations.
- See the Siemens Download Center at www.siemens.com/bt/download for the latest application configuration and workflow tutorials.
- Option combination according to available on-board I/Os on controller.
- B1 (optional extract air temperature sensor) must be configured under 'Room temperature' in order to serve for room temperature control.
- D2a (on-board presence detector) to be configured in ABT Site under 'Presence detector 2' for maximum combination of optional devices.
Type of operation (NO or NC). Multiple devices of the same type can be connected.

Management station

Sample presentation of an active chilled beam with hot water radiator application on the Desigo CC management station.