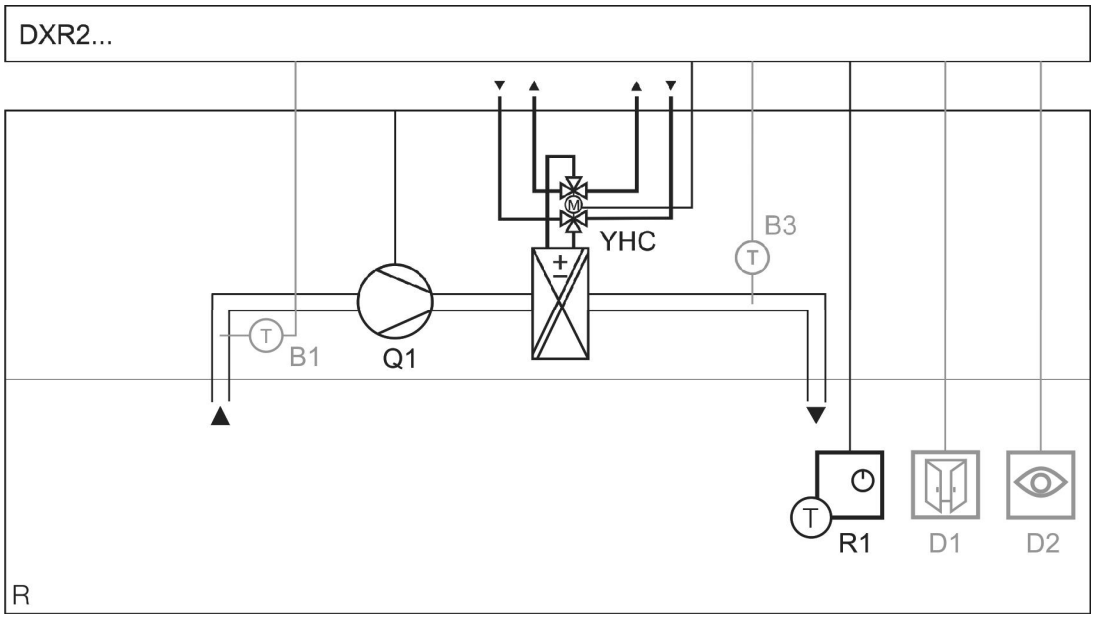
Fan coil unit with staged fan, 6-way heating/cooling coil (4 pipe) on analog output

DXR2..09-101A

- **Heating with LTHW and cooling with CHW changeover**
- **Modulating control of heating/cooling coil 6-way valve (4 pipe) on analog output**
- **Automatic or manual 3-speed fan control**
- **Room temperature and fan speed operation via KNX PL-Link room operator unit with temperature measurement**

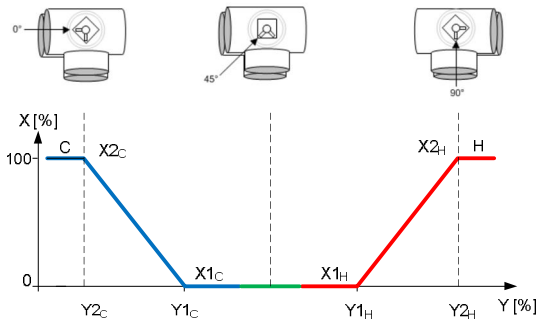
Plant diagram



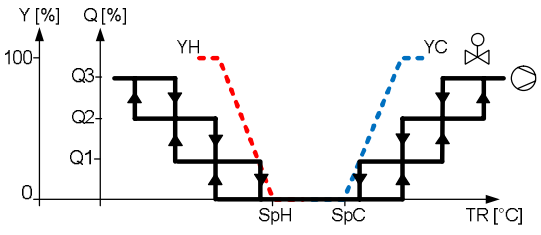
DXR2…	Room automation station	Q1	3-speed fan
B1	Extract air temperature sensor	R	Room
B3	Supply air temperature sensor	R1	Room operator unit with temperature sensor
D1	Window contact		
D2	Presence detector	YHC	Heating/cooling coil valve

Function diagrams

6-way valve



1-2-3-speed fan



C	Cooling sequence	$X2_C$	Cooling coil valve position for value X2
H	Heating sequence	$X2_H$	Heating coil valve position for value X2
Q	Fan output signal	Y	Valve output signal
SpC	Effective cooling setpoint	$Y1_C$	Cooling coil valve position for value Y1
SpH	Effective heating setpoint	$Y1_H$	Heating coil valve position for value Y1
TR	Room temperature	$Y2_C$	Cooling coil valve position for value Y2
X	Valve opening	$Y2_H$	Heating coil valve position for value Y2
$X1_C$	Cooling coil valve position for value X1	YC	Cooling valve
$X1_H$	Heating coil valve position for value X1	YH	Heating valve

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Description of functions

Basic functions

- PID control for heating and cooling.
- The 4 pipe system provides hot and chilled water for the heating/cooling coil.
- 6-way valve 0...10 V controlled by analog output for heating and cooling.
- The fan is controlled manual on the room operator unit or automatic in 3 speeds.
- The temperature is measured in the room operator unit.
- The application allows customers to adjust the room temperature setpoints via the room operator unit.
- The operating modes are Comfort, Pre-Comfort, Economy and Protection.
- Change of operating mode via room unit, presence detector, window contact or central command.
- The air flow for heating and cooling is operated in sequence to the valves. Parallel operation can be configured.

Options

- 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.

Auxiliary functions

- Green Leaf (RoomOptiControl) function.
- Multisegment use of DXR2 automation stations with fan coil unit application.
- Standard hot and cold water supply chain control.
- 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.

Variants

- The room temperature can be measured by:
  - 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, 230 V, flat housing, 1 DI, 2 UI, 3 DO relays, 3 AO 0…10 V	N9204	DXR2.E09-101A	1
		N9206	DXR2.M09-101A	
R1	KNX PL-Link room operator unit with temperature sensor, segmented backlit display, touchkeys	N1602	QMX3.P34	1
YHC	6-way valve	A6V10564480	VWG41.20..	1
	Electromotive actuator, AC 24 V, DC 0...10 V	N4657	GDB161.9E	1

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

[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.

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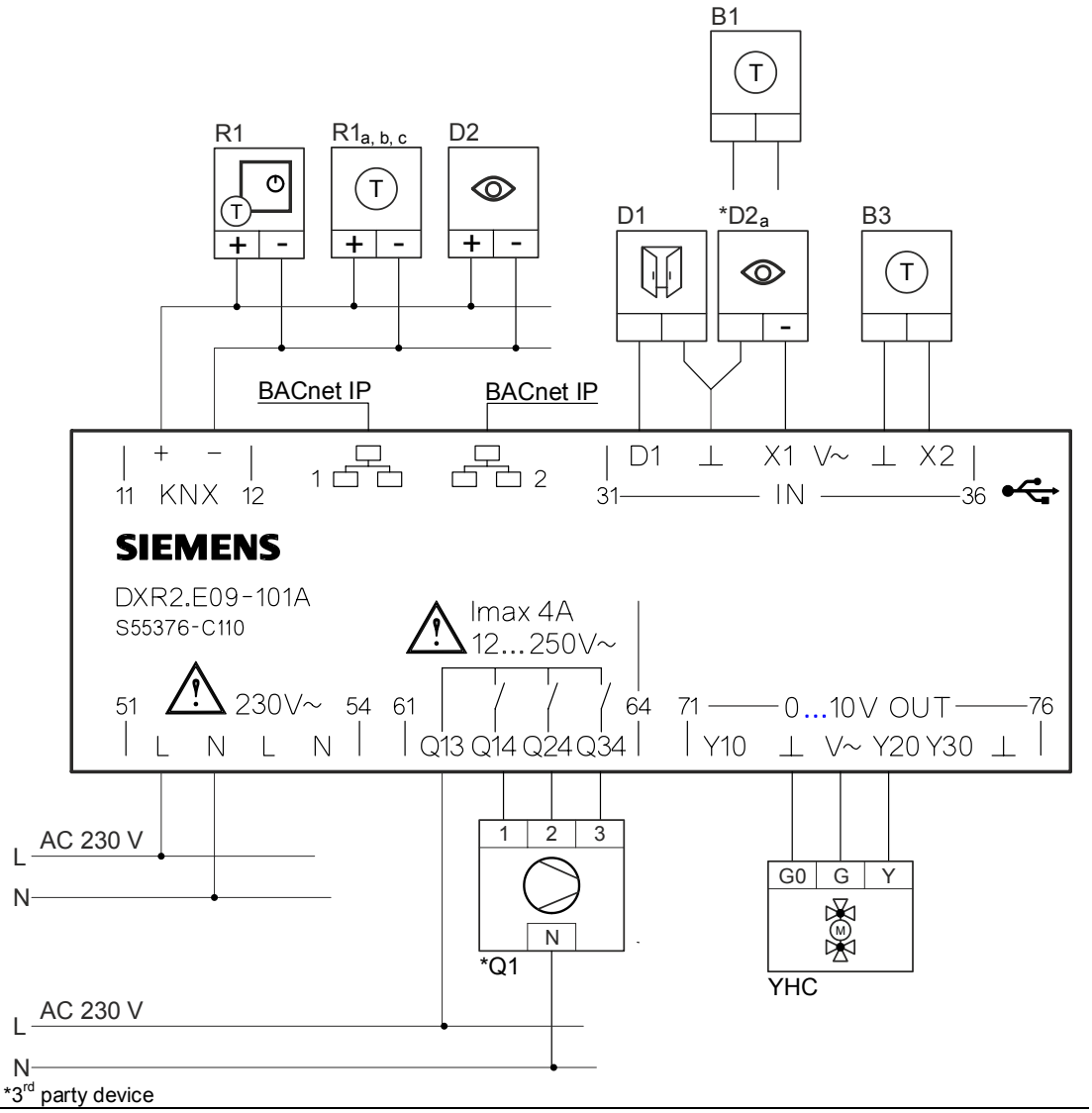
Variants	Legend	Type of unit	Data sheet	Product No.	Qty.
	$R1_a$	KNX PL-Link wall-mount room sensor for temperature	N1602	QMX3.P30	1
	$R1_b$	KNX PL-Link flush-mount room operator unit	N1601	QMX3.P36	1
	$R1_c$	KNX PL-Link flush-mount room sensors	N1411	AQR253… AQR257…	1

Connection diagram



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Application configuration

	Equipment	Values/Range	Template settings
On-board output	Fan speed	1-stage; Q14; Normally open 2-stage; Q14, Q24; Normally open 3-stage; Q14, Q24, Q34; Normally open Variable speed; Y10; 0...10 V	3-stage; Q14, Q24, Q34; Normally open
	Heating/cooling coil valve position	2-pipe; Y20; 0...10 V 2-pipe; Y30; 0...10 V 4-pipe 6-way; Y20; 0...10 V 4-pipe 6-way; Y30; 0...10 V	4-pipe 6-way; Y20; 0...10 V
KNX PL-Link devices	Room operator unit device 1	QMX3.P02, QMX3.P34, QMX3.P36, QMX3.P37, QMX3.P74	QMX3.P34

Optional configuration

	Equipment		Values/Range	Template settings
On-board input	Room temperature	(B1)		X1; LG-Ni1000
	Supply air temperature	(B3)		X2; LG-Ni1000
	Presence detector 2	($D2_a$)		X1, Normally open
	Window contact	(D1)		D1; Normally closed
KNX PL-Link devices	Sensor device 1…4	(D2)		UP 258D12

Default values

	Parameter	Values/Range	Template settings
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
Heating/cooling coil	Cooling coil valve position for value X1	0 … 100 %	0 %
	Cooling coil valve position for value Y1	0 … 100 %	50 %
	Cooling coil valve position for value X2	0 … 100 %	100 %
	Cooling coil valve position for value Y2	0 … 100 %	0 %
	Heating coil valve position for value X1	0 … 100 %	0 %
	Heating coil valve position for value Y1	0 … 100 %	50 %
	Heating coil valve position for value X2	0 … 100 %	100 %
	Heating coil valve position for value Y2	0 … 100 %	100 %
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 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

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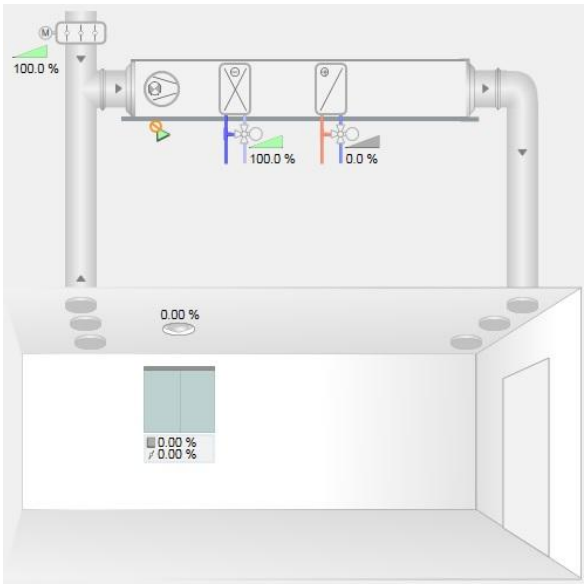
Default values

	Parameter	Values/Range	Template settings
	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

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) to be configured under ‚Room temperature' in order to serve for room temperature control.
- $D2_a$ (on-board presence detector) to be configured in ABT Site under ‚Presence detector 2' for maximum combination of optional devices.
  Type of operation (N/O or N/C). Multiple devices of the same type can be connected.

Management station



Sample presentation of a fan coil unit application on the Desigo CC management station.

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