Technical note
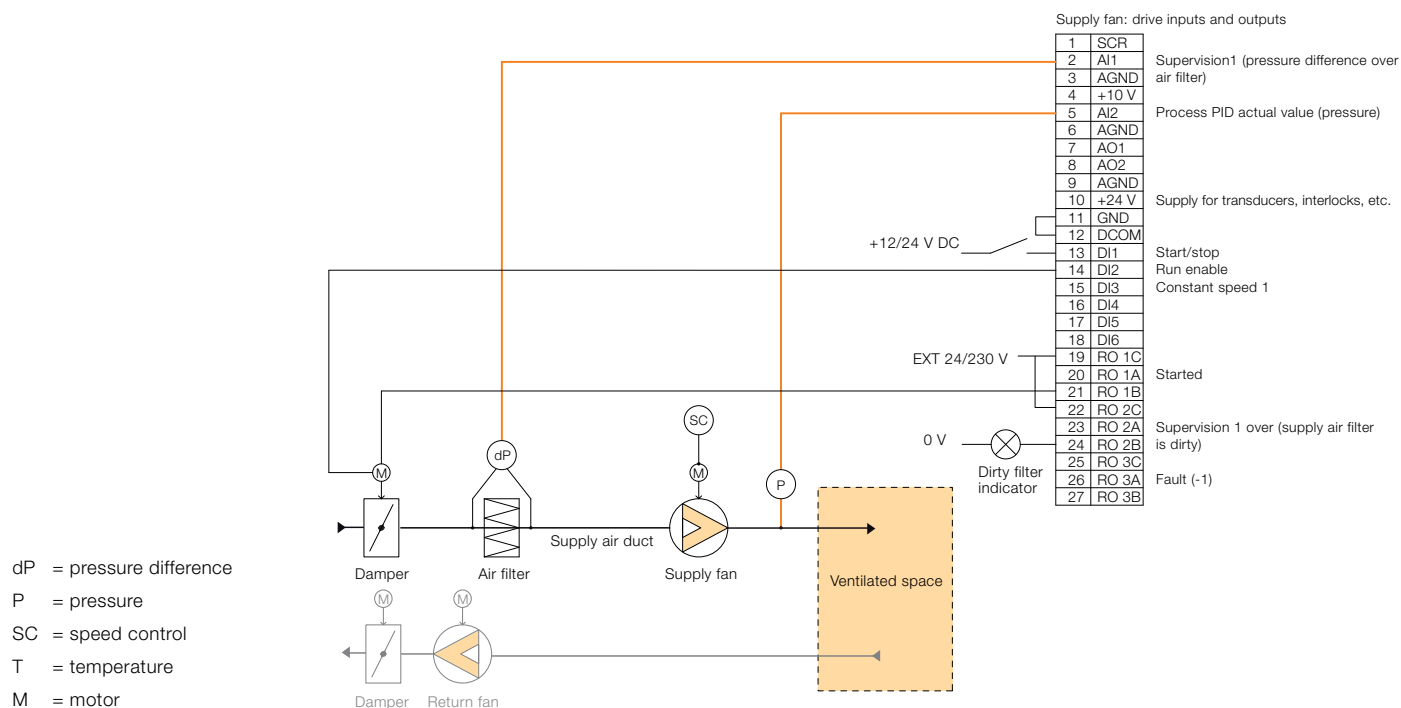# Maintaining constant indoor air pressure using pressure control via ABB standard drive for HVAC

Supply fan: drive inputs and outputs

1	SCR	
2	AI1	Supervision1 (pressure difference over air filter)
3	AGND	
4	+10 V	
5	AI2	Process PID actual value (pressure)
6	AGND	
7	AO1	
8	AO2	
9	AGND	
10	+24 V	Supply for transducers, interlocks, etc.
11	GND	
12	DCOM	
13	DI1	Start/stop
14	DI2	Run enable
15	DI3	Constant speed 1
16	DI4	
17	DI5	
18	DI6	
19	RO 1C	
20	RO 1A	Started
21	RO 1B	
22	RO 2C	
23	RO 2A	Supervision 1 over (supply air filter is dirty)
24	RO 2B	
25	RO 3C	
26	RO 3A	Fault (-1)
27	RO 3B	

+12/24 V DC

EXT 24/230 V

0 V

Dirty filter indicator

dP = pressure difference
P = pressure
SC = speed control
T = temperature
M = motor

Damper

Air filter

Supply air duct

Supply fan

Ventilated space

Damper   Return fan

Functional description

1. Activating start/stop (DI1) in the AC drive starts supply fan.

2. With start/stop (DI1) activated, started relay (RO1) closes and damper opens. With damper fully open, its limit switch activates run enable (DI2) and supply fan starts running.

3. Supply fan stops running if damper closes, as supply fan drive's run enable (DI2) deactivates.

4. Supply fan drive controls its motor's rotating speed. Faster motor rotation generates higher supply air volume and pressure in ventilated space. Drive controls supply air volume via its PID controller depending on pressure in ventilated space. Pressure sensor is connected directly to supply fan drive's analog input 2 (AI2). The lower the pressure the faster the fan motor rotates to reach the pressure setpoint.

5. Relay named supervision 1 over (RO2) activates when pressure difference over supply air filter reaches preset limit. Dirty filter indicator shows need for air filter change, whereupon filter has to be cleaned or replaced.

6. If pressure signal (AI2) drops below 10 percent of its maximum value, a signal loss fault is triggered within AC drive, whereupon drive starts running at an average speed based on last 10 seconds. The function is used to detect fault in pressure sensor or its wiring.

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Examples of parameter settings

Changed parameters

Supply fan drive

Below are typical parameter settings, most of which can be adjusted depending on the constant pressure desired. When the parameter settings are completed, the control panel displays motor output frequency (top line), ventilated space pressure setpoint (middle line) and ventilated space pressure actual value (bottom line). Note that the display panel shown here depicts the results from this particular parameter setting. This will vary depending on each individual setup.

9902 = SUPPLY FAN [2] (application macro selection)

1102 = EXT2 [7] (speed reference given by process PID)

1301 = 0% (AI1 minimum value, adjustable)

1304 = 0% (AI2 minimum value, adjustable)

1402 = SUPRV1 OVER [8] (RO2 activates when differential pressure exceeds a limit ie, filter is dirty)

1608 = NOT SEL [0] (start enable 1, not used)

1609 = NOT SEL [0] (start enable 2, not used)

2007 = 10 Hz (minimum fan motor speed, adjustable)

2202 = 5 s (fan speed ramp-up time, adjustable)

2203 = 5 s (fan speed ramp-down time, adjustable)

2606 = 12 kHz (switching frequency, selectable)

3001 = LAST SPEED [3] (speed if AI signal is lost)

3022 = 10% (AI2 signal fault limit)

3201 = AI1 [120] (supervision 1 function input is AI1)

3203 = 70.0% (supervision 1 high limit, percentage from AI1 maximum value, adjustable)

4001 = application specific (process PID gain, adjustable)

4002 = application specific (process PID integration time, adjustable)

4003 = application specific (process PID derivation time, adjustable)

4006 = Pa [45] (process PID actual value unit, selectable)

4007 = 0 (process PID actual value scaling, 0 decimals)

4009 = 500 Pa (maximum value of process PID actual value, adjustable)

4010 = INTERNAL [19] (process PID setpoint selection)]

4011 = 300 Pa (process PID internal setpoint value, adjustable)

4016 = AI2 [2] (process PID actual value input selection)

3408 = PID 1 SETPNT [128] (control panel display signal 2 selection)

3415 = PID 1 FBK [130] (control panel display signal 3 selection)

About alarms

There are many different types of alarms available and below is a small sample. The alarm listed here refers to the supply fan parameters listed above.

– 2007 AI2 loss = analog input 2 is lost, check cabling

For more information please contact:

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