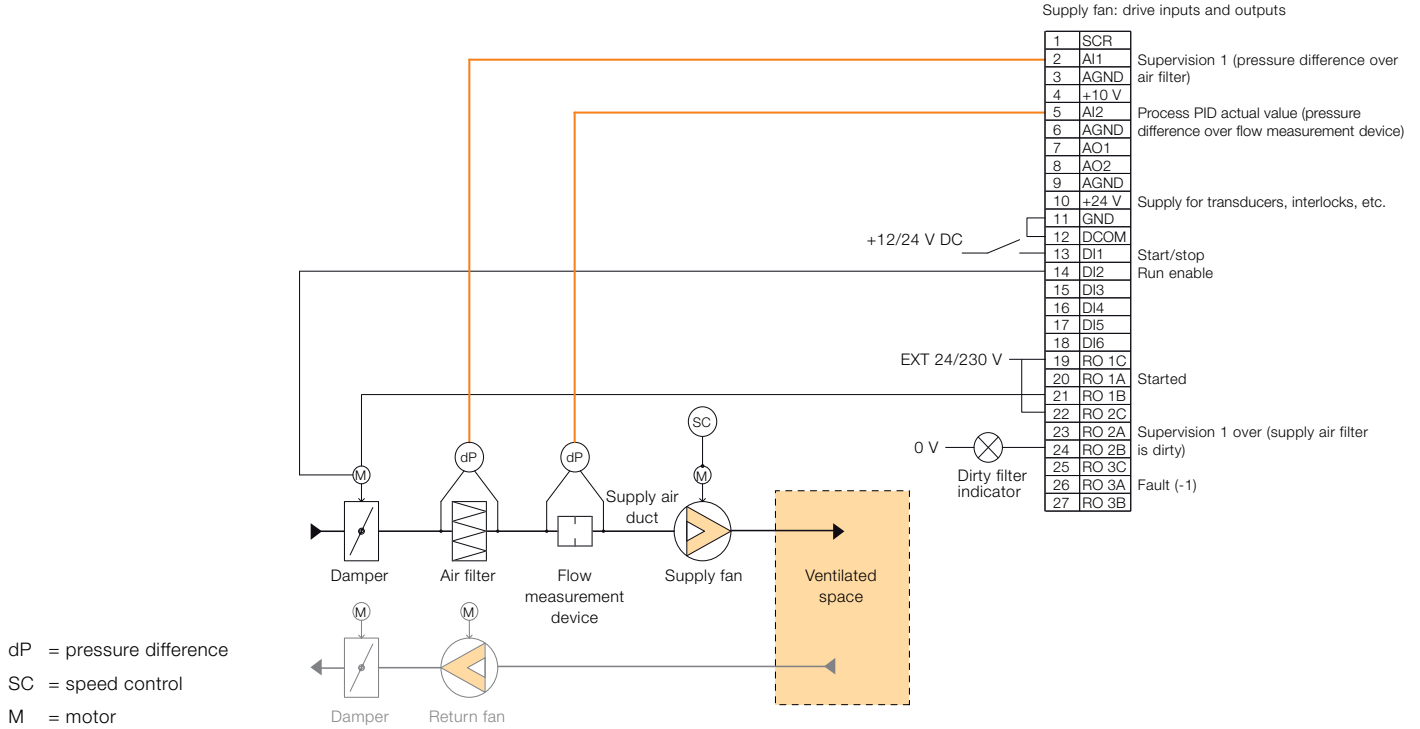


Technical note

Maintaining required air flow using ABB standard drive for HVAC



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 air flow in supply air duct. Obtaining desired air flow means measuring air flow in supply air duct. Pressure difference is measured across air flow measurement device. Pressure difference sensor is connected directly to supply fan drive's analog input 2 (AI2). Air flow measurement device can be, for instance, a venturi tube, which has a device specific K value. This K value is placed into a formula together with maximum pressure difference. Control is now implemented in clear engineering units (e.g. m³/s). The lower the air flow measured the faster the fan motor has to be rotated to reach air flow 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 the 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.

Examples of parameter settings

Changed parameters

Supply fan drive

Below are typical parameter settings, most of which can be adjusted depending on the air flow required. When the parameter settings are completed, the control panel displays motor output frequency (top line), air flow setpoint (middle line) and air flow 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 = 80.0% (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 = m³/s [39] (process PID actual value unit, selectable)
- 4007 = 2 (process PID actual value scaling, 2 decimals)
- 4009 = 21.21 m³/s (calculated from the K value and the maximum pressure difference over the device
 $q = k * \sqrt{(\Delta P)}$)
- 4010 = INTERNAL [19] (process PID setpoint selection)
- 4011 = 14.00 m³/s (process PID internal setpoint value, adjustable)
- 4014 = sqrt (ACT1) [10] (applies square root to the PID controller feedback signal coming from AI2)
- 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:

www.abb.com/drives

www.abb.com/drivespartners

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